

ORENCO®
PRELOS™ SEWER
EQUIPMENT SPECIFICATIONS

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PRELOS™ SEWER EQUIPMENT SPECIFICATIONS

PART 1. GENERAL

1.01 DEFINITIONS

Wherever used in these specifications, capitalized and in bold text, the terms listed below will have the meanings indicated, which are applicable to both the singular and plural thereof.

- **Bid** – The offer or proposal of a **Bidder**, submitted on the prescribed form, setting forth the prices for the work to be performed.
- **Bidder** – An individual or entity who submits a **Bid** directly to the **Owner**.
- **Contractor** – The individual or entity with whom the **Owner** has entered into an agreement to install a **Prelos™ Sewer**.
- **Prelos Gravity Effluent Discharge (PGED)** – **Prelos Sewer** equipment used at sites where the elevation allows effluent discharge into a pressurized collection main without the use of a pump.
- **Prelos Pressurized Effluent Discharge (PPED)** – **Prelos Sewer** equipment used at sites where a pump is used to discharge effluent into a pressurized collection main.
- **Prelos Processor** – A fully integrated unit that provides onsite storage, filtration, pumping, and primary treatment as part of an effluent sewer system. The **Prelos Processor** includes a meander tank, fiberglass risers, ClickTight™ electrical connections for pumps and control floats, a hanging pump discharge assembly, and a passive self-cleaning Biotube® filter.
- **Prelos Sewer** – An effluent sewer system that relies on **Prelos Processors** and Prelos technology.
- **Effluent Sewer** – A wastewater pretreatment and collection system designed to provide onsite solids retention and reduction and to convey primary-treated liquid effluent to a centralized facility for treatment.
- **Engineer** – The individual or entity responsible for preparation and certification of the construction plans and/or construction management.
- **Inspector** – The specific individual designated by the **Owner**, **Engineer**, **Contractor**, and **Manufacturer** to ensure quality control by inspecting and certifying that each Prelos sewer package is in compliance with the **Manufacturer's** recommendations and requirements.
- **Manufacturer** – A supplier, fabricator, distributor, or vendor having a direct or indirect contract with **Contractor** or **Owner** to furnish materials or equipment to be incorporated in the work by **Contractor**.
- **Manufacturer's Representative** – A firm under contract with the **Manufacturer** to sell or solicit sales and/or represent the **Manufacturer** as a limited agent for the Manufacturer's products.
- **Owner** – The individual or entity that has entered into the direct or indirect contract and for whom the work is to be performed.

1.02 GENERAL DESCRIPTION

The **Prelos Sewer** package shall be an Orenco® **Prelos Processor**, installed in accordance with the plans and these specifications. The **Prelos Processor** is unique, both in its fabrication and its function. Accordingly, no substitutions shall be permitted. **Manufacturer** or **Manufacturer's Representative** shall furnish a complete, factory-built and -tested **Prelos Processor(s)**, consisting of a meander tank, fiberglass risers, ClickTight™ electrical connections for pumps and control floats, a hanging pump discharge assembly, and a passive self-cleaning Biotube® filter.

1.03 SUBMITTALS

Manufacturer or **Manufacturer's Representative** shall submit an electronic set of shop drawings and technical data sheets. The submittals shall clearly specify the materials of construction and equipment compatibility, along with drawings for each unique package being supplied. There shall be no alternatives or substitutions considered.

1.04 EXPERIENCE CLAUSE

The equipment furnished shall be manufactured and supplied by a company experienced in the design and manufacture of effluent sewer systems. **Manufacturer** shall have a minimum ten (10) years' experience in the design and manufacture of effluent sewer systems of similar size and equipment specified. **Manufacturer** shall have a minimum of twenty-five (25) successful installations of effluent sewer systems, five (5) of which shall have more than 100 connections or be at least the size of the system being bid, whichever is smaller. In lieu of

this experience, the system **Manufacturer** is required to submit a 5-year performance bond for 150% of the cost of the equipment, to guarantee replacement of equipment in case of failure.

1.05 MANUFACTURER

Manufacturer shall be Orenco Systems®, Inc. **Manufacturer** shall furnish a complete, factory-built **Prelos Processor(s)**, consisting of a meander tank, fiberglass risers, ClickTight™ electrical connections for pumps and control floats, a hanging pump discharge assembly, and a passive self-cleaning Biotube® filter. **Manufacturer** or **Manufacturer's Representative** shall supply detailed installation and O&M (operation and maintenance) instructions. **Manufacturer** shall also provide the following support personnel:

- A. Experienced support staff dedicated to supporting the project through design, construction, and O&M.
- B. Asset Management Department dedicated to assisting operators with operational and maintenance activities.

1.06 WARRANTY

Manufacturer shall warrant that all component products comprising a **Prelos Processor** shall be free from defects in materials or workmanship that cause the product to lose structural integrity or to electrically or mechanically operate improperly for a period of not less than five (5) years, except that the **Prelos** pump, provided it is an Orenco multi-stage, high-head, submersible turbine pump, shall be similarly warranted for a period of not less than ten (10) years. Warranty term shall ensue after **Owner's** acceptance and system start-up procedures are complete. **Manufacturer** shall submit details of all limitations and exclusions that may apply to the warranty. The warranty shall be documented in product literature. The use of any non-Prelos components during the warranty period shall render the warranty null and void.

1.07 INTEGRATED SYSTEM

The entire **Prelos Processor**, including meander tank, fiberglass risers, ClickTight™ electrical connections for pumps and control floats, hanging pump discharge assembly, and passive self-cleaning Biotube® filter shall be an integrated package provided by a single manufacturer and designed to work together.

1.08 SERVICEABILITY

The **Prelos Processor(s)** shall be completely serviceable, with easy access to the pump(s), filter, and float switches. The pump(s) shall be lightweight (less than 30 lbs) and designed for easy removal without removing the filter and float switches. The pumps must consist of a motor, a liquid end, and an electrical cable and must be repairable (by replacing impellers and/or diffusers), serviceable, and cleanable.

1.09 BUILDING SEWER

Building-side sewers shall be watertight and installed by a **Contractor** licensed for such work as per all applicable local and state licensing requirements. Building sewer materials, installation, and testing shall be per the current local plumbing code.

PART 2. PRELOS™ PROCESSOR TANK

2.01 PROCESSOR TANK

A. **Manufacturer** shall be Orenco Systems or approved equal. **Manufacturer** or **Manufacturer's Representative** shall supply detailed installation, operation, and maintenance instructions and warranty terms to **Engineer**. **Manufacturer** shall provide the structural design and certification to the **Engineer** for review. The design shall be in accordance with accepted engineering practice. All tanks shall be made of dicyclopentadiene (DCPD). **Prelos Processor** tanks shall be suitable for residential applications with as many as four bedrooms. Tank sizing for homes with more than four bedrooms shall be at the discretion of **Engineer** and in accordance with all applicable regulations.

B. Loading criteria:

- 1. The tank shall be rated for a minimum 500 lbs/ft² loading criteria, based on a saturated backfill of 140 lbs/ft³ and an unsaturated backfill of 127 lbs/ft³.
- 2. Minimum lateral loading shall be 62.4 lbs/ft³. Lateral loading shall be determined from ground surface.
- 3. The tank shall support a concentrated wheel load of 2,500 lbs.

C. There are four (4) typical loading conditions that should be analyzed:

- 1. 5-foot bury + full exterior hydrostatic load
- 2. 5-foot bury + full exterior hydrostatic load + 2,500-lb wheel load

3. 1-foot bury + 2,500-lb wheel load
 4. Interior hydrostatic load with tank full and unsupported by soil. Load case 4 represents the tank full of liquid at 62.4 lbs/ft³. This condition addresses seam and haunch stress-strain relationships that occur during watertightness testing, as well as poor soil bedding conditions that provide inadequate support.
- D. Tanks requiring deep burial (> 60 inches) or subject to truck or heavy traffic loading require special consideration. A minimum soil cover of 12 inches shall be used, unless specified otherwise by **Manufacturer**.
 - E. All tanks shall be designed to be structurally sound and watertight and shall be warranted in writing by **Manufacturer** for a period of five (5) years from the date of final acceptance. **Manufacturer**'s warranty, including any and all limitations and exclusions, shall accompany **Bid**. The tank warranty shall be furnished at the time of submittal. The tank shall be capable of withstanding long-term hydrostatic loading with a water table maintained at ground level in addition to soil loading.
 - F. All tanks shall be manufactured and furnished with one access opening capable of accepting a 30-inch diameter access riser of the configuration shown on **Manufacturer**'s drawings. This access port will provide access to both the inlet and the outlet/discharge pumping equipment. Modification of completed tanks will not be permitted.
 - G. Inlet plumbing shall include an inlet tee that penetrates 18 inches into the liquid from the inlet flow line. (The depth may vary depending on the tank's height; in all cases, though, the inlet should extend to a level below the bottom of the maximum scum depth.) The inlet plumbing shall allow for natural ventilation back through the building sewer and vent stack.
 - H. Tanks shall be capable of successfully withstanding an above-ground static hydraulic test and shall be individually tested to **Manufacturer**'s specifications.
 - I. All tanks shall be installed in strict accordance with **Manufacturer**'s recommended installation instructions.
 - J. DCPD tanks shall be analyzed using finite element analysis for buried structures, and calculations shall address the following:
 1. Strength
 2. Buckling
 3. Deflection of 5% of the tank diameter, based on service load (including long-term deflection lag)
 4. Buoyancy
 - K. The material properties and laminates considered in this analysis shall be DCPD. The resin must be considered acceptable for use with tank construction. The thicknesses for different regions of the tanks shall be described and shown in shop drawings for each individual tank. Typical design strength properties are as follows:

1. Design tensile strength (psi)	6,700
2. Design flexural strength (psi)	10,500
3. Design compressive strength (psi)	9,200
4. Design shear in-plane (psi)	7,180
5. Flexural modulus (psi)	274,000
 - L. The tank shall be molded from thermoset dicyclopentadiene (DCPD) using the Reaction Injection Molding (RIM) process. Any permanent metal part shall be 300-series stainless steel.
 - M. The minimum tank weight shall be specified by **Manufacturer**'s engineer (e.g., 450 lbs± for 1,000-gallon tanks).
 - N. All penetrations specified for the tank shall be provided by **Manufacturer**.
 - O. A **Manufacturer**-supplied EPDM grommet, methacrylate structural adhesive, ABS inlet adapter, or approved equal, shall be used at the inlet to join the tank wall and the inlet piping.
 - P. In order to demonstrate watertightness, tanks shall be tested at the place of assembly and again on-site prior to acceptance. Each tank shall be tested at the factory, prior to shipping. During installation, each tank shall be backfilled to just below the midseam flange; then, the tank shall be completely filled with water, to a level two (2) inches into the riser. The tank shall be inspected for leaks after a minimum two-hour wait (or as required by local rules). There should be no drop in liquid level and no visual leakage from seams, pinholes, or other imperfections. No tank will be accepted if there is any leakage over the two-hour period. Once the tank has passed this field test, the water level in the tank shall be dropped to a level below the tank invert, but not below the mid-seam.
 - Q. Installation shall be in accordance with **Manufacturer**'s recommendations, or as shown on the contract plans, whichever is more stringent – with no variations.

PART 3. TANK ACCESS EQUIPMENT

3.01 RISERS

Manufacturer shall be Orenco Systems, Inc. Risers shall be required for access to internal components and access to the tanks for septage pumping. All risers shall be fiberglass and shall be constructed to be watertight. The risers shall be attached to the tanks such that a watertight seal is achieved. Risers shall extend three (3) inches above final grade, or as directed by applicable regulations or codes, to allow for settlement and to ensure positive drainage away from the access. Adhesive required to adhere the fiberglass risers to the tank shall be a two-component methacrylate structural adhesive or approved equal. To ensure product compatibility, Orenco Systems, Inc. shall supply all risers, lids, and attachment components.

3.02 LIDS

One lid shall be furnished with each access riser. Lids shall be Orenco Systems, Inc. DuraFiber™ Model FLD30G, fiberglass with green finish, and provided with stainless steel bolts and wrench. **Manufacturer** shall provide evidence that lids have been used successfully in continuous field service for a minimum of five (5) years to demonstrate long-term integrity and suitability for the application. Lids shall be waterproof, corrosion-resistant, and UV-resistant. Lids shall be flat, with no noticeable upward dome; a crown or dome of no more than 1/8-inch is allowable. Lids shall not allow water to pond excessively on top of them. Lids shall have a non-skid finish. Lids shall be designed to form a watertight seal with the top of riser. Lids shall be capable of withstanding a truck wheel load (81 square inches) of 2,500 pounds for 60 minutes with a maximum vertical deflection of 3/4-inch. Lids shall be provided with tamper-resistant stainless-steel fasteners and a tool for fastener removal. Tamper-resistant fasteners include recessed drives, such as hex, Torx, and square. Fasteners that can be removed with common screwdrivers, such as slotted and Phillips, or fasteners that can be removed with standard tools, such as pliers or crescent wrenches, are not considered tamper-resistant. To prevent a tripping hazard, fasteners shall not extend above the surface of the lid.

Optional components may include the following:

- A. Traffic-bearing lid: The traffic-bearing lid shall be a cast iron frame and cover (part number 6024, 3060, 4036), as manufactured by Sather Manufacturing Co., Inc. or approved equal, which will fit over a standard lid. The cover shall have the word "SEWER" cast into it.
- B. Foam-insulated lid: Rigid closed-cell foam insulation of 2-inch or 4-inch thickness shall be attached to the underside of the lid. Any fasteners shall be made of corrosion-resistant stainless steel. The insulation shall have an R-value of no less than 10 per 2-inch increment.

3.03 RISER INSTALLATION

Riser installation shall be accomplished according to **Manufacturer's** instructions. For cold weather areas, risers shall be backfilled with 3/8-inch pea gravel or other similar granular material to prevent frost heave.

PART 4. PRELOS™ GRAVITY EFFLUENT DISCHARGE (PGED) ASSEMBLIES

All filter systems shall be supplied by a reputable **Manufacturer** with at least ten (10) years of experience in supplying equipment for liquid only sewers. Effluent filters shall prevent particles larger than 1/8-inch in diameter from leaving the tank. Effluent filters shall have a solid bottom or deflecting device that prevents vertically rising solids from reaching the filtering surface area during ebullition (sludge bulking).

4.01 RISERS AND LIDS

See PART 3, TANK ACCESS EQUIPMENT.

4.02 SINGLE-FAMILY RESIDENCE PRELOS™ FILTERS

Standard: Prelos 4-inch Biotube Effluent Filter

Tanks set up for **Prelos Gravity Effluent Discharge (PGED)** for single-family dwellings of fewer than four bedrooms shall be equipped with an Orenco Systems, Inc. Biotube Effluent Filter (FT04 Model series) or **Engineer**-approved equal, installed in conformance with **Engineer's** plans. Filter shall consist of a 4-inch diameter PVC vault with eight (8) 1 1/8-inch diameter holes evenly spaced around the perimeter, located appropriately to allow for maximum sludge and scum accumulation before requiring pumping (approximately 70% of minimum liquid level). The Biotube cartridge shall be made with 1/8-inch mesh polypropylene and with a solid base to prevent solids from entering through the bottom during ebullition. The Biotube cartridge shall be housed inside the PVC vault. The filter shall have an effective filter area of no less than 5.1 square feet ± 5%. The

lateral from the tank to the collection line shall be laid to a uniform grade with no high points. An optional flow-modulating orifice containing two (2) ½-inch diameter flow-modulating orifices and one (1) ½-inch diameter vent hole is available.

Alternate: Prelos 8-inch Biotube Effluent Filter

For single-family dwellings of four bedrooms or more, the tanks shall be a minimum of 1,500 gallons and equipped with an Orenco Systems, Inc. Biotube Effluent Filter (FT08 Model series) or **Engineer**-approved equal, installed in conformance with **Engineer**'s plans. Filter shall consist of an 8-inch diameter PVC vault with eight (8) 1⅜-inch diameter holes evenly spaced around the perimeter, located appropriately to allow for maximum sludge and scum accumulation before requiring pumping (approximately 70% of minimum liquid level). The Biotube cartridge shall be made with 1/8-inch mesh polypropylene and with a solid base to prevent solids from entering through the bottom during ebullition. The Biotube cartridge shall be housed inside the PVC vault. The filter shall have an effective filter area of no less than 14.6 square feet ± 5%. The direct-coupled outlet for the 8-inch filter shall contain two (2) 1⅛-inch diameter flow-modulating orifices and one (1) ¾-inch diameter vent hole. The lateral from the tank to the collection line shall be laid to a uniform grade with no high points.

4.03 COMMERCIAL AND MULTIPLE-USER TANKS

Commercial and multiple-user tanks require larger Prelos filters, the sizes of which must be individually determined and spelled out in the specifications. Commercial applications should be sized according to the Orenco Systems, Inc. document titled "Biotube Effluent Filter Sizing."

4.04 ALARM FLOAT (OPTIONAL)

Float switch shall be mercury-free Orenco Systems, Inc. Model MFP, mounted on a PVC stem and attached to the filter housing. The float must be adjustable and removable without removing the filter cartridge. The high-level alarm shall be preset as shown in the **Engineer**'s plans. The float lead shall be secured with a nylon strain relief bushing at the splice box.

4.05 EXTERNAL ELECTRICAL SPLICE BOX (OPTIONAL)

External splice box shall be Orenco Systems, Inc. Model SBEX series or **Engineer**-approved equal, UL-approved for wet locations, equipped with up to four (4) electrical cord grips and two (2) ¾-inch outlet fittings. Also included shall be UL-listed, waterproof wire nuts. The use of a UL-approved conduit seal kit, accessible above ground, shall be required to prevent the passage of gases, vapors, or flames through the conduit to the control panel. An additional UL-classified sealant shall be added to the splice box coupling to prevent condensation accumulation in the splice box. The following UL-approved sealants shall be used:

- A. UL-classified moisture-cure polyurethane quick-drying foam or **Engineer**-approved equal with an R-5 rating per inch of foam.
- B. UL-classified silicone sealant or **Engineer**-approved equal consisting of a neutral-cure, non-acetic, non-corrosive silicone capable of withstanding temperatures to 450° F.

4.06 ALARM PANEL (OPTIONAL)

Alarm panels shall be Orenco Systems, Inc. AM series. Alarm panels shall be listed per UL 508 and rated for indoor/outdoor use. For most applications, an Orenco Systems, Inc. Model AMAHW or **Engineer**-approved equal alarm panel meeting the following specifications shall be used:

- A. Enclosure: Measures 6 inches high x 6 inches wide x 4 inches deep, UL Type 4X (IP 66)
- B. Audio Alarm: 95 dB at 24 inches, warble-tone sound, gasketed, UL Type 4X (IP 66)
- C. Visual Alarm: 7/8-inch diameter red lens, "push-to-silence," UL Type 4X, 1-watt LED bulb, 120 VAC
- D. Audible Alarm Silence Relay: 120VAC, automatic reset

PART 5. PRELOS PRESSURIZED EFFLUENT DISCHARGE (PPED) SYSTEM FOR SINGLE-FAMILY RESIDENCES

The collection system on-lot package shall be certified to have been manufactured by Orenco Systems, Inc. **Manufacturer** shall provide a unique Certificate of Origin with each collection system on-lot package. Certificates of Origin shall list all products in the collection system on-lot package and warrant them to be free from defects in materials and workmanship that cause the product to lose structural integrity or to operate improperly – electrically or mechanically – for a period of five (5) years from the date of installation of the equipment. **Manufacturer** shall submit detailed limitations and exclusions from the warranty.

5.01 PRELOS PROCESSOR PUMPING SYSTEM

The **Prelos Processor** pumping system is an integrated package designed specifically for use in the **Prelos Processor** tank. **Manufacturer** of the complete, integrated system shall be Orenco Systems, Inc. and shall provide the following integrated components as part of the system:

- A. The Prelos pump vault shall be manufactured of sturdy, corrosion-proof polyethylene with an effective screen area of 13.5 square feet. The vault shall have a sloped inlet port to pull from the tank's clear zone, allow for solids to slough or settle out during resting periods, and allow for solids to be flushed out during servicing. The filter must be serviceable and cleanable without removing pumps or the entire vault.
- B. The Prelos pump shall be a submersible, high-head Prelos pump. Unless specified otherwise by the design engineer, the pump shall be Orenco Systems, Inc. Model PF100511CV, 1/2 hp, 115 VAC, single phase, 60 Hz, two-wire motor, with 10-foot-long, extra-heavy-duty (SOOW) electrical cord with ground, terminating in a ClickTight-compatible male plug. The male plug shall be a glass-filled thermoplastic with a silicone gasket, 3-pole, and a max load of 13 amps at 240 volts. The pump shall include an internal check valve and shall be capable of delivering 18 gpm at a pressure of 14 feet and 10 gpm at 171 ft, with a shut-off head of 250 feet. When used in conjunction with a flow controller, the pump shall be capable of providing 5 gpm against a head of 190 feet. The pump shall be UL- and CSA-listed for use with Prelos. The pump liquid end must have a minimum 24-hour run-dry capability without water lubrication while submerged in water. The pump shall have a 1/8-inch bypass orifice to ensure flow circulation for motor cooling and to prevent air bind. The pump shall have a floating impeller design to protect against upthrust and to increase pump life. The pump's liquid ends must be repairable (by replacing impellers and/or diffusers) for better long-term cost of ownership. The motor must be rated for continuous use and frequent cycling, at least 300 cycles per day. The motor cable must be suitable for Class 1 and Division 1 and 2 applications. The pump shall be lightweight (less than 30 pounds) for easy removal and maintenance. The pump intake screen must be 1/8-inch mesh polypropylene. The pump shall have internal thermal overload protection and internal lightning protection. All pumps shall undergo 3-point (dead head, design flow, and design flow + 30%) wet testing at the factory to confirm performance.
- C. The discharge piping system shall be a hanging style, allowing for quick removal without unions. The discharge assembly shall be Orenco Systems, Inc. Model HDAS30125FCASLC hanging-style discharge assembly or **Engineer**-approved equal. Discharge assembly shall be 1 1/4-inch diameter and include an anti-siphon mechanism, flow control disk, and high-pressure reinforced EPDM flex hose with working pressure rating of 250 psi, 1 1/4-inch quick-disconnect, line check valve, and Schedule 80 PVC pipe.
- D. The high-pressure external flex hose shall be Orenco Systems, Inc. Model HVX125PR series or **Engineer**-approved equal. Hose shall be reinforced EPDM and constructed of a special elastomer compound with a working pressure of 250 psi. The high-pressure external flex hose connections shall be clamped with Oetiker® stainless steel, two-ear clamps or **Engineer**-approved equal.
- E. Float switches shall be mercury-free, Orenco Systems, Inc. Model MF2P with two mechanical float switches mounted on a PVC stem and attached to the filter. The float switches must be adjustable and must be removable without removing the pump vault. The float switch cords must terminate in a ClickTight-compatible male plug. The male plug shall be glass-filled thermoplastic with a silicone gasket, 2-pole, and rated for 1.0 amps at 120 VAC. The high-level alarm and ON/OFF function shall be preset as shown in the **Engineer**'s plans. All float switches shall be rated for 1.0 amps at 120 VAC.
- F. The wiring connection system shall be Orenco Systems, Inc. ClickTight™ Model CLK-2-60 or **Engineer**-approved equal. The ClickTight must be pre-wired with 62 feet of direct burial PVC/nylon cable, with 14 AWG wire for the pump and 18 AWG wire for the float switches. The housing shall be UL-listed for wet locations and have three female plugs: two (2) capable of accepting the male plugs from the float switches and one (1) capable of accepting the male plug from the pump.
- G. Controls and alarms shall be listed per UL 508. Panels shall be repairable in the field without the use of soldering irons or substantial disassembly. For most single-family home applications, control panel shall be an Orenco Systems, Inc. Model S1-HR series with high water redundant ON/OFF feature, or **Engineer**-approved equal control panel that includes the following:

Standard Components:

- 1. Motor-Start Contactor: 120 VAC, 1hp, 17 FLA, 60 Hz, 2.5 million cycles at FLA (10 million at 50% of FLA)
- 2. Toggle Switch: Single-pole, double-throw HOA switch, 20 amps, 1 hp
- 3. Controls Circuit Breaker: 10 amps, OFF/ON switch, single-pole 120 VAC, DIN rail mounting with thermal magnetic tripping characteristics
- 4. Pump Circuit Breaker: 20 amps, OFF/ON switch, single-pole 120 VAC, DIN rail mounting with thermal magnetic tripping characteristics

5. Audio Alarm: 95 dB at 24 inches, warble-tone sound
6. Visual Alarm: 7/8-inch diameter red lens, "push-to-silence," UL Type 4X, 1-watt LED bulb, 120 VAC
7. Panel Enclosure: Measures 11.5 inches high x 9.3 inches wide x 5.4 inches deep, UL Type 4X rated or Type 3R when using a generator receptacle, constructed of UV-resistant fiberglass, stainless steel hinges and latch
8. S1-HR Panel Ratings: 120 VAC, 1 hp, 14 amps, single phase, 60 Hz

Optional Components:

1. Redundant Off Relay: 120 VAC, secondary off, sounds alarm on low-level condition, DIN rail mount
2. Pump Run Light: 7/8-inch green lens, UL Type 4X, 1-watt LED bulb, 120 VAC
3. Heater: Anti-condensation, self-adjusting (radiates additional wattage as temperature drops)
4. 3-Way (main, auto, off) manual transfer/disconnect switch
5. Generator Receptacle
6. Event Counter: 120 VAC, 6-digit, non-resettable
7. Elapsed-Time Meter: 120 VAC, 7-digit, non-resettable, limit of 99,999 hours, accurate to 0.01 hours
8. Larger Panel Enclosure (as required); size to be determined by **Manufacturer**

5.02 INSTALLATION

All pumping system components shall be installed in accordance with **Manufacturer's** recommendations, **Engineer's** plans, and all state and local regulations.

5.03 LOCATION

The pump control panel shall be mounted on an exterior wall near the tank and pump. Preferably, the wall should be a garage or outbuilding where the sound of the motor contactor engaging won't be noticed. If a garage or outbuilding wall isn't available, installation should include use of sound-deadening insulation. Alternately, the panel may be mounted on a post. The control panel shall be located within 50 feet of, and in sight of, the pump motor or shall be provided with a lockable disconnect switch. When possible, the panel should be mounted in the shade and protected from the weather. The panel should be installed at a convenient height (four to five feet above final grade) and where it will be accessible for maintenance.

PART 6. PRELOS PRESSURIZED EFFLUENT DISCHARGE (PPED) SYSTEM FOR COMMERCIAL CONNECTIONS.

The collection system on-lot package shall be certified to have been manufactured by Orenco Systems, Inc. or **Engineer**-approved equal. The Discharge System shall be a Prelos™ Processor Pumping System as specified in Section 5.01, unless specified as a Biotube Pumping System on the plans or in the specification. **Manufacturer** shall provide a unique Certificate of Origin with each collection system on-lot package that lists all products in the package and warrants that these products be free from defects in materials and workmanship that cause the product to lose structural integrity or to electrically or mechanically operate improperly for a period of five (5) years from the date of installation of the equipment. **Manufacturer** shall submit detailed limitations and exclusions from the warranty.

6.01 ALTERNATIVE BIOTUBE® PUMPING SYSTEM (Commercial Applications)

The Biotube Pumping System is an integrated package designed for use in concrete, fiberglass, or polyethylene tanks. The Biotube Pumping System shall only be utilized when specifically called for in the plans and specifications. **Manufacturer** of the complete, integrated system shall be Orenco Systems, Inc., and shall provide the following integrated components as part of the system:

- A. The pump vault shall be a Universal Biotube Pump Vault, Model PVU series, installed in conformance with the **Engineer's** plans. The filter shall have a minimum effective screen area of no less than 14.5 square feet. The Biotube pump vault shall consist of a 12-inch diameter polyethylene vault with eight (8) 2-inch diameter holes evenly spaced around the perimeter, located appropriately to allow for maximum sludge and scum accumulation before requiring pumping (approximately 70% of minimum liquid level). The Biotube assembly, consisting of 1/8-inch mesh polypropylene tubes, shall be housed inside the polyethylene vault. Attached to the vault is a flow inducer to accept one or two high-head Prelos pumps. Alternatively, the Prelos Biotube pump vault may be used in accordance with Section 5.01 of this specification, if approved by the **Engineer** or shown in the design plans.
- B. All pumps shall comply with general requirements set forth in Section 5.01 (above). All commercial applications shall use duplex (2-pump) pumping systems for redundancy, unless specified otherwise by the **Engineer**. Pump shall be Orenco Systems, Inc., Model PF series high-head pump, Hp, 120 or 240 VAC, single phase, 60 Hz, two-wire motor, with 10-foot-long, extra-heavy-duty (SOOW) electrical cord with ground. Pump shall be capable

of delivering [] gpm at a pressure of [] ft, [] gpm at [] ft, and [] gpm at [] ft. Pump shall be UL- and CSA-listed for use with Prelos. Pump liquid ends must have a minimum 24-hour run-dry capability without water lubrication while submerged in water. Pump shall have a 1/8-inch bypass orifice to ensure flow circulation for motor cooling and to prevent air bind. Pump shall have a floating impeller design to protect against upthrust and to increase pump life. Pump's liquid ends must be repairable (by replacing impellers and/or diffusers) for better long-term cost of ownership. Pump motor must be rated for continuous use and frequent cycling, at least 100 cycles per day. Pump motor cable must be suitable for Class 1 and Division 1 and 2 applications. Pump shall be lightweight for easy removal and maintenance. Pump intake screen must be 1/8-inch mesh polypropylene. Pump shall have internal thermal overload protection and internal lightning protection. All pumps shall undergo 3-point (dead head, design flow, and design flow + 30%) wet testing at the factory to confirm performance.

- C. Discharge assembly shall be Orenco Systems, Inc. Model HDAD30125CASLC hanging-style discharge assembly or **Engineer**-approved equal. Discharge assembly shall be 1 1/4-inch diameter and include a bronze check valve, anti-siphon mechanism, and high-pressure reinforced EPDM flex hose with working pressure rating of 250 psi, 1 1/4-inch EZ pull quick-disconnect, line check valve, and Schedule 80 PVC pipe. The high-pressure external flex hose shall be Orenco Systems, Inc. Model HVX125PR series or **Engineer**-approved equal. Hose shall be reinforced EPDM and constructed of a special elastomer compound with a working pressure of 250 psi.
- D. Float switches shall be mercury-free Orenco Systems, Inc., Model MF4P with four float switches mounted on a PVC stem and attached to the filter cartridge. The float switches must be adjustable and must be removable without removing the pump vault. The high/lag, pump on, pump off, and low-level alarms shall be preset as shown in the **Engineer**'s plans. Each float lead shall be secured with a nylon strain-relief bushing at the splice box. The floats shall be UL- or CSA-listed.
- E. External Splice Box

Standard: SBEX

The splice box shall be Orenco Systems, Inc. Model SBEX series external splice box or **Engineer**-approved equal, UL-approved for wet locations, equipped with up to four (4) electrical cord grips and two (2) 3/4-inch outlet fittings. Also included shall be UL-listed waterproof wire nuts. The use of a UL-approved conduit seal kit, accessible above ground, shall be required to prevent the passage of gases, vapors, or flames through the conduit to the control panel. An additional UL-classified sealant shall be added to the splice box coupling to prevent condensation accumulation in the splice box. The following UL-approved sealants shall be used: UL-classified, moisture-cure, polyurethane quick-drying foam or **Engineer**-approved equal with an R-5 rating for each inch of foam or UL-classified silicone sealant or **Engineer**-approved equal consisting of a neutral-cure, non-acetic, non-corrosive silicone able to withstand temperatures to 450° F.

Alternate: Class 1, Division 1 Splice Box

The splice box shall be Orenco Systems, Inc. Model SBX series or **Engineer**-approved equal, UL-approved for Class I, Division 1 Type D gas applications, equipped with one quick-disconnect, aluminum receptacle, and malleable iron mounting box. An explosion-proof fitting for pump wire connections shall also be included. The enclosure shall be corrosion-resistant and contain a ground screw within the hub. The sealing fitting shall be sealed using Chico® "A" sealing compound.

F. CONTROLS AND ALARMS

The control panel shall be Orenco Systems, Inc. MVP DAX series duplex control panel. Controls and alarms shall be listed per UL 508. Panels shall be repairable in the field without the use of soldering irons or substantial disassembly.

Panel shall include the following components:

Standard Components:

1. Programmable Logic Unit: 120/240 VAC programmable logic unit with built-in LCD screen and programming keys, providing control functions and timing, if necessary, for panel operation
2. Motor-Start Contactor: 120 VAC 17 FLA, 1 hp, 60 Hz, 2.5 million cycles at FLA (10 million at 50% FLA) and 240 VAC 17 FLA, 3 hp, 60 Hz, 2.5 million cycles at FLA (10 million at 50% FLA)
3. Toggle Switch: Single-pole, double-throw HOA switch, 20 amps, 1 hp
4. Controls Circuit Breaker: 10 amps, OFF/ON switch, single-pole 120 VAC, DIN rail mounting with thermal magnetic tripping characteristics
5. Pump Circuit Breaker: 20 amps, OFF/ON switch, single-pole 120 VAC, double-pole 240 VAC, DIN rail mounting with thermal magnetic tripping characteristics; power supplied by a 30-amp breaker
6. Audio Alarm: 95 dB at 24 inches, warble-tone sound
7. Visual Alarm: 7/8-inch diameter red lens, "push-to-silence," UL Type 4X, 1-watt LED bulb, 120 VAC

8. Panel Enclosure: UL Type 4X rated or Type 3R when using generator receptacles with stainless steel hinges, latch, and conduit couplings provided
9. MVP Panel: Ratings of 120 VAC, 1 hp, 16 amps, single phase, 60 Hz and 240 VAC, 3 hp, 16 amps, single phase, 60 Hz

Optional Components:

1. Pump Run Light: 7/8-inch green lens, UL Type 4X, 1-watt LED bulb, 120 VAC
2. Prelos Alarm: 95 dB at 24 inches, warble-tone sound
3. Flashing Light: Red, Lexan lens, flanged based, UL-recognized
4. 3-Way (main, auto, off) Manual Power Transfer/Disconnect Switch
5. Generator Receptacle
6. 120 VAC Ground Fault Interrupter (GFI)
7. Surge Arrestor: AG2401 120/230V, three 18-inch leads, rated for a maximum of 32,000 amps, UL/CSA-listed
8. Heater: Anti-condensation, self-adjusting (radiates additional wattage as temperature drops)
9. Intrinsically Safe Controls Relays: Larger enclosure required; 120 VAC; listed per UL 913; for Class I, Div. I, Groups A, B, C, and D hazardous locations
10. Current Sensor: 120 VAC, go/no-go operation, pump fail indicator light on panel, manual reset switch

G. ACCESS RISERS

See PART 3, TANK ACCESS EQUIPMENT.

6.02 INSTALLATION

All pumping system components shall be installed in accordance with **Manufacturer's** recommendations, **Engineer's** plans, and all state and local regulations.

6.03 LOCATION

Contractor shall locate the pump control panel on an exterior wall or post nearest the tank and pump. If mounted to an exterior wall, it should be to a garage or outbuilding where the sound of the motor contactor engaging won't be noticed. If a garage or outbuilding wall isn't available, installation should include use of sound-deadening insulation. The control panel shall be located within 50 feet of, and in sight of, the pump motor or shall be provided with a lockable disconnect switch. When possible, the panel should be mounted in the shade and protected from the weather. The panel should be installed at a convenient height (four to five feet above final grade) and where it will be accessible for maintenance.

6.04 SERVICE CONNECTION

The service connection shall be Orenco Systems, Inc. Model SC100 (1-inch), SC125 (1.25-inch), SC150 (1.5-inch), or SC200 (2-inch) or **Engineer**-approved equal. Service connection will include a swing-check valve, factory-connected to a ball valve. All components will be PVC Schedule 40 and rated for 150 psi.

- A. Service connection shall be enclosed in PVC access riser as manufactured by Orenco Systems, Inc. or **Engineer**-approved equal. Risers shall extend to 3 inches above the ground surface to allow for settlement and shall have a minimum nominal diameter of 8 inches.
- B. One lid shall be furnished with each access riser. Lids shall be Orenco Systems, Inc. Model FL8G or **Engineer**-approved equal, acrylonitrile styrene acrylate (ASA), with green non-skid finish.

6.05 SERVICE LINE TESTING

An air compressor may be used to bring the line to its test pressure; the test is a success if the pressure holds for 60 seconds or more. Any leakage will require the line to be repaired and retested. When the service line can be filled with water from the tank test, particularly if the service line is short and doesn't require a large volume to fill it, a small hand pump with pressure gauge can be employed for the pressure test.

PART 7. FORCE MAIN COMPONENTS & TESTING

7.01 COMBINATION AUTOMATIC AIR/VACUUM RELEASE VALVE

The release valve shall be A.R.I. Model D-021 or **Engineer**-approved equal. Valve base shall be made of reinforced nylon and include a base O-ring seal constructed of Buna N rubber. Body shall be constructed of reinforced nylon, housing a foamed polypropylene float, and a stainless steel stem. Valve will also include a polypropylene elbow to expel air horizontally. Valve shall be corrosion resistant and operable with a minimum line pressure of 3 psig.

- A. Piping shall be Orenco Systems, Inc. Model ARA or **Engineer**-approved equal. Piping shall be constructed of Schedule 40 PVC and include a 2-inch diameter PVC isolation valve, a 3/4-inch diameter PVC ball valve for bypass, and a pressure gauge connection. All components shall be rated for 150 psi working pressure.
- B. Air-release assembly shall be enclosed in a 30-inch diameter access riser as manufactured by Orenco Systems, Inc. or **Engineer**-approved equal. The material shall be FRP. Risers shall extend to 3 inches above the ground surface to allow for settlement and shall have a minimum nominal diameter of 30 inches. A 48 x 48 x 4-inch thick concrete apron shall be poured around the FRP riser. FRP access risers are not intended for traffic areas.
- C. Lids shall be Orenco Systems, Inc. Model FLD30G DuraFiber™ lid or **Engineer**-approved equal, with green non-skid finish, provided with stainless steel bolts and wrench. The riser and lid combination shall be sealed for watertightness and able to support a 2,500-lb. wheel load.

7.02 MANUAL VALVES

The valve shall be Orenco Systems, Inc. Model ARA or **Engineer**-approved equal as listed above. Valves will include the following piping:

- A. Piping shall be constructed of Schedule 40 PVC and include a 2-inch diameter PVC isolation valve, a 3/4-inch diameter PVC ball valve for bypass, and a pressure gauge connection. All components shall be rated for 150 psi working pressure and allow the installation of a combination air/vacuum release valve.
- B. Manual valve assembly shall be enclosed in a 30-inch diameter access riser as manufactured by Orenco Systems, Inc. or **Engineer**-approved equal. The material shall be FRP. Risers shall extend to 2 inches above the ground surface to allow for settlement and shall have a minimum nominal diameter of 30 inches. A 48 x 48 x 4-inch thick concrete apron shall be poured around the FRP riser. FRP access risers are not intended for traffic areas.
- C. Lids shall be Orenco Systems, Inc. Model FLD30G DuraFiber™ lid or **Engineer**-approved equal, with green non-skid finish, provided with stainless steel bolts and wrench. The riser and lid combination shall be sealed for watertightness and able to support a 2,500-lb. wheel load.

7.03 FORCE MAIN TESTING

- A. **Contractor** shall adhere rigorously to all hydrostatic testing procedures and requirements. Allowable AWWA leakages should be the maximum, not to be exceeded. Zero leakage is the goal.

The hydrostatic test procedure is as follows:

1. Fill the line with water to expel air.
2. Pressurize to the desired pressure at the lowest point.
3. Hold for two hours to ± 5 psi of test pressure.
4. Accurately record time, pressure readings, and amount of leakage.
5. For further details, refer to AWWA C 600 Section 4.

Allowable Loss, Gal/Hr/1,000 Feet of Line

Test Pressure	3 in.	4 in.	6 in.	8 in.	10 in.	12 in.
150 psi	0.28	0.37	0.55	0.74	0.92	1.10
125 psi	0.25	0.34	0.50	0.67	0.84	1.01
100 psi	0.23	0.30	0.45	0.60	0.75	0.90

$$L = \frac{S D \sqrt{P}}{133,200}$$

Where:

L = Allowable leakage for push-on or mechanical joints, gph*

S = Length of pipe tested, feet

D = Nominal pipe diameter, inches

P = Average test pressure, psi, at lowest location on test section

*Add 0.0078 gal./hour/inch of nominal valve size for each metal-seated gate valve pumped against.

- B. Portions of the line that are critical or suspect should be left exposed throughout the hydrostatic test to allow visual inspection. Leaks detected visually should be repaired regardless of test results. The use of dye during initial filling and testing of a mainline section makes isolating leaks much easier, especially in areas with high ground water.
- C. Check valve failure in service lines is difficult to diagnose and may misrepresent mainline integrity. Therefore, service line connections should remain closed until mainline testing has been completed. Accurate records must be kept to assure all service line connections have been opened after the mainline system has been approved.

- D. Testing long segments of line should be avoided whenever possible. A lengthy segment of line may pass the leakage test, yet still have an isolated leak that is excessive, and which could prove to be a problem later. Testing shorter segments of line reduces this possibility and more readily isolates any leaks. The most common recommendation is to limit the test length to 12,000/D, where D is the diameter in inches and the length of the segment is in feet.
- E. Because air escapes from pipelines more rapidly than does liquid, it is important that all air is purged from a section of line prior to hydrostatic testing. Failure to do so may give misleading test results, possibly causing the section of line to appear to fail the test.

PART 8. SUPPORT, TRAINING, TESTING, AND OVERSIGHT

8.01 PRECONSTRUCTION CONFERENCE

Before any work at the site is started, a conference attended by **Owner, Contractor, Engineer, and Manufacturer** (or **Manufacturer's Representative**) and others, as appropriate, will be held to establish a working understanding among the parties as to the work involved for installing each Prelos sewer unit. At this conference, **Owner, Contractor, Engineer, and Manufacturer** shall designate, in writing, a specific individual to act as **Inspector** for the installation of each Prelos sewer unit. Any cost or fees associated with the services of the **Inspector** or the **Engineer** during construction will be the responsibility of the **Owner**.

8.02 INSTALLATION AND FIELD-TESTING TRAINING

- A. **Manufacturer** or **Manufacturer's Representative** shall provide the services of a trained representative to instruct the installing **Contractor's** crew and **Inspector** regarding the proper installation and field-testing of each Prelos sewer unit per **Manufacturer's** recommendations and requirements. **Manufacturer** or **Manufacturer's Representative** shall have a trained representative provide installation and training services for a minimum of one (1) eight-hour day at the beginning of construction.
- B. As part of the **Manufacturer's** or **Manufacturer's Representative's** installation training, and to help ensure that subsequent installations are installed in accordance with **Manufacturer's** installation instructions, the **Manufacturer**, or **Manufacturer's Representative**, shall inspect and submit an inspection checklist report for the first (complete) installation. Subsequent installations shall not commence until the first installation is inspected by the **Manufacturer** or **Manufacturer's Representative** and **Inspector** and accepted by **Engineer**.

8.03 QUALITY CONTROL

- A. To ensure quality control, **Inspector** shall inspect and certify that an initial installation of each Prelos sewer unit is in compliance with **Manufacturer's** recommendations and requirements, using the form provided in APPENDIX A, "PRELOS SEWER INSTALLATION CHECKLIST."
- B. Upon completion of the inspection, **Inspector**, in coordination with **Engineer**, shall perform or direct **Contractor** to perform any required adjustments to the equipment and place it into operation under the supervision of **Engineer**. All equipment and materials required to perform the testing shall be the responsibility of **Contractor**. The completed inspection checklist shall be signed by the **Inspector** and copies faxed, emailed, or mailed to **Engineer** and **Manufacturer(s)** within one (1) week of each corresponding Prelos sewer unit being installed and prior to system commissioning.
- C. The **Manufacturer** or **Manufacturer's Representative** shall provide the services of a trained representative for a minimum of one (1) eight-hour day for the purpose of quality control during construction.

8.04 SYSTEM COMMISSIONING

- A. The **Manufacturer** or **Manufacturer's Representative** shall provide the services of a trained representative for training the **Owner's** service provider, and, when directed, randomly inspecting Prelos sewer installations throughout the project. The inspection will include items covered in APPENDIX A, "PRELOS SEWER INSTALLATION CHECKLIST," as well as the Prelos package, wiring, and control panel placement. Upon system commissioning, the **Manufacturer's** or **Manufacturer's Representative's** trained representative shall provide **Engineer** a written report of findings. **Engineer** should then perform or direct **Contractor** to perform any required adjustments to the equipment and place it into operation. All equipment and materials required to perform additional testing shall be the responsibility of **Contractor**.
- B. The **Manufacturer** or **Manufacturer's Representative** shall provide the services of a trained representative for a minimum of one (1) eight-hour day for the purpose of system commissioning.

PART 9. OPERATION AND MAINTENANCE

9.01 OPERATION AND MAINTENANCE MANUAL

Manufacturer shall provide five (5) operation and maintenance manuals: four (4) to be sent to **Owner**, and one (1) to be sent to **Engineer**. Operation and maintenance manuals shall include a signed copy by **Inspector** of APPENDIX A, "PRELOS™ SEWER INSTALLATION CHECKLIST," for each Prelos™ sewer installation.

9.02 SPARE PARTS

Manufacturer shall provide spare parts in accordance with the following schedule:

- A. One (1) spare pump for every 50 **Prelos Processors** installed
- B. Four (4) spare floats for every 50 **Prelos Processors** installed
- C. Two (2) anti-siphon valves
- D. One (1) 10-amp circuit breaker for every 50 **Prelos Processors** installed
- E. Two (2) 20-amp circuit breakers for every 50 **Prelos Processors** installed
- F. One (1) Motor Start Contactor for every 50 **Prelos Processors** installed
- G. Three (3) ETM-CT kits for troubleshooting site-specific problems
- H. One (1) Programmable Logic Unit for every 100 **Prelos Processors** Installed
- I. One (1) ClickTight wiring connection system for every 50 **Prelos Processors** installed

9.03 OPERATION AND MAINTENANCE TOOLS

- A. Scum Measuring Device: **Manufacturer** shall provide a minimum of one (1) scum measuring utility gauge. The gauge shall be a minimum of 3/8-inch diameter and have an incremental scale for measuring scum levels. The rod shall be bent at a 90-degree angle at the base to aid in identifying the scum "by feeling." The gauge shall be Orenco Systems, Inc. Model SMUG or **Engineer**-approved equal.
- B. Sludge Measuring Device: **Manufacturer** shall provide a minimum of one (1) Sludge Judge Ultra or **Engineer**-approved equal. Unit shall be constructed of polycarbonate treated with an ultraviolet stabilizer, durable in cold temperatures, and able to withstand heat up to 280° F. The measuring device shall be 3/4-inch diameter and marked with tape to designate 1-foot increments.
- C. Biotube Cartridge Cleaning Brush: **Manufacturer** shall include a minimum of one (1) Biotube cartridge cleaning brush. Brush shall be Orenco Systems, Inc. Model OM-BIOTUBE BRUSH or **Engineer**-approved equal for cleaning Biotube pump vault filter cartridges.
- D. Hanging Discharge Removal Hook: **Manufacturer** shall include a minimum of one (1) Hanging Discharge Removal Hook. Hook shall be Orenco Systems, Inc. Model OM-HDA-TOOL or **Engineer**-approved equal for removing hanging pump assemblies from vaults.

APPENDIX A

PRELOS SEWER INSTALLATION CHECKLIST

SYSTEM OWNER: _____ DATE: _____

SITE ADDRESS: _____

SYSTEM PROVIDER: _____ CONTRACTOR: _____

INSPECTOR: _____

AS-BUILT SITE DIAGRAM:

Please draw an as-built sketch of the site, including approximate location of buildings, property boundaries, trees, fences, existing septic systems, existing wells, new tank, recirculation tanks, pump basins, AdvanTex system, sewer piping, drainfield, etc. Include dimensions.

Yes	No	Pre-Installation	Date/Initial
		Tank location approved per Engineer	
		Panel location approved per Engineer	
		Electrical supply (# circuits/disconnect) checked	
		Prelos sewer equipment package reviewed and approved	
		Certificate of Origin received	
		Service connection located	
		Riser-to-tank connection and piping-to-tank method reviewed	
		Tank warranty received	
		Date of manufacture specified	
		Factory leak test documentation received	
		Inlet connection approved	
		Inlet tee installed	
		Riser-to-tank connections approved	
		Tank level checked and tank properly bedded	
		Leak test/watertight test (tank filled 2 in. above tank/riser connection) passed	

Yes	No	Pumping System	Date/Initial
		ClickTight location acceptable	
		Pump vault/screen easily accessible for maintenance	
		Discharge assembly installed correctly	
		Service lateral properly bedded with sufficient depth	
		Toning wire present	
		Check valve installed correctly	
		Control panel location and height acceptable	
		Conduit wiring acceptable (waterproof wire nuts used)	
		Seal-offs acceptable (panel and splice box)	
		Service connection valve box accessible	
Yes	No	Start-Up	Date/Initial
		Risers backfilled to grade (within 2 inches of lid)	
		Appropriately sized pump circuit breaker	
		Circuit breaker marked appropriately	
		Separate alarm circuit (preferred, not required)	
		Pump operation checked (voltage and amperage)	
		Float operation, alarm, on/off, and low-level checked	
		Float settings accurate (record dimensions from top of tank)	
		Alarm, on/off, low level checked	
		Controls, audible alarm/visual alarm checked	
		Emergency call sticker in place	
		All lids in place and locked	
		"Homeowner's Manual" delivered to homeowner	
		Site pictures attached	

Inspector Signature: _____ Date: _____