Prelos® 50Hz Sewer
Specifications

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SECTION 00000
PRELOS® 50Hz SEWER 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 on-site 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 float switches, 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 on-site 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** complies with the **Manufacturer**'s recommendations and requirements.
- **Manufacturer** – A supplier, fabricator, distributor, or vendor having a direct or indirect contract with the **Contractor** or **Owner** to furnish materials or equipment to be incorporated in the work by the **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. The **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 float switches, a hanging pump discharge assembly, and a passive self-cleaning Biotube filter.

1.03 SUBMITTALS

The **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 OR ENGINEER-APPROVED EQUAL

For this project, "**Engineer**-approved equal" shall mean equal in the judgment of the **Engineer**, and the term "**Engineer**-approved equal" will therefore be used throughout this specification as defined in this section.

A. Should the **Bidder** seek approval of an alternative product, system, or component substitute other than the brand or brands named in the specifications, the **Bidder** shall furnish written evidence that such substitute conforms in all respects to the specified requirements and that it has been used successfully elsewhere under similar conditions. It will not be the responsibility of the **Engineer** to research, review, or determine equality, nor the responsibility of the **Manufacturer**, specified within these specifications, to provide research, documentation, or data supporting the difference between the substitute and what is specified. This will be the sole responsibility of any **Bidder** seeking the approval.

B. Where the specified requirements involve conformance to recognized codes or standards, the **Bidder** shall furnish evidence of such conformance in the form of test or inspection reports, prepared by a recognized agency, and bearing an authorized signature. The **Manufacturer**'s standard data and catalog cut sheets will not be considered sufficient in themselves, and the **Engineer** will not be responsible for seeking further data from the **Manufacturer**, or for otherwise researching the alternative. Failure to provide complete data will be cause for rejection of the alternative. The submission shall include any impacts that could be expected from the substitute and shall also indicate any product that would require a license or royalty, the actual fees, and a note that these fees would be handled by the **Bidder**. The **Bidder** shall provide submissions meeting the above parameters no less than TWO WEEKS prior to **Bid** opening for review by the **Engineer**. **Bidder**(s) seeking **Engineer** approval of substitutes shall provide, at minimum, the following information:

1. Product and system submittals, including, but not limited to, the number of years the **Manufacturer** has been in the business of manufacturing relevant products/systems.
2. Company size, including:
    a. Number of employees related to relevant products/systems
    b. Number of engineers on staff related to relevant products/systems
3. Product specifications and a detailed description of how each alternative product or component is "equal" to the specified product, system, or component. A side-by-side comparison is required.
    a. Equipment/system warranty along with exclusions
    b. Performance claims, including, but not limited to:
        1) Treatment design
            - Surface area
            - Maintenance frequency
        2) Pump motor description
            - **Manufacturer** and origin
            - Length of service
            - Number of units in operation
            - Life-cycle cost (repair and replacement frequency)
            - Warranty
        3) Pump liquid-end description
            - **Manufacturer** and origin
            - Length of service
            - Number of units in operation
            - Life-cycle cost (repair and replacement frequency and cost). Note: liquid ends must be removeable, repairable, and cleanable.
            - Warranty

4) Corrosion resistance

5) Pump lead description

- Lead must be extra-heavy-duty SOOW, 600V cord, CSA approved (the Orenco PF7515 uses a 14AWG, SJOOW, 300V cord).

6) Control panel components

- **Manufacturer** and origin
- Length of service
- Number of units in operation
- Warranty
- Enclosure description

c. Evidence of successfully obtaining approval for a system with similar permit requirements with the regulating authority

d. Summary of product/system track record and history, including, but not limited to:

1) Number of similarly sized systems

2) Detailed summary of, at minimum, ten (10) similarly sized systems, at least five (5) years old, including, but not limited to:

- Project name, location, and application
- Years in operation
- Current average daily flows and design flows
- Operator name and contact information

C. **Bidder** shall specify and furnish documentation related to **Manufacturer** (or **Manufacturer's Representative**) support services, including, but not limited to:

1. Installation training program and support material
2. Installation oversight program and support material
3. Operator training program and support material
4. Start-up services program and support material

D. **Engineer** is eligible for reimbursement for the evaluation of any alternative product substitute, including, but not limited to:

1. Installation training program and support material
2. Installation oversight program and support material
3. Operator training program and support material
4. Start-up services program and support material

1.05 EXPERIENCE CLAUSE

The equipment furnished shall be manufactured and supplied by a company experienced in the design and manufacture of **Effluent Sewer** systems. The **Manufacturer** shall have a minimum ten (10) years' experience in the design and manufacture of **Effluent Sewer** systems of similar size and equipment specified. The **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.

1.06 MANUFACTURER

The **Manufacturer** shall be Orenco. The **Manufacturer** shall furnish a complete, factory-built advanced **Prelos Processor**(s), consisting of a meander tank, fiberglass risers, ClickTight electrical connections for pumps and control float switches, a hanging pump

discharge assembly, and a passive self-cleaning Biotube filter. The **Manufacturer** or **Manufacturer's Representative** shall supply detailed installation and O&M (operation and maintenance) instructions. The **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.

1.07 WARRANTY

The **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 from the date of installation, except for the pump, which shall be from the date of manufacture. The **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.

1.08 INTEGRATED SYSTEM

The entire **Prelos Processor,** including meander tank, fiberglass risers, ClickTight electrical connections for pumps and control float switches, 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.

1.09 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 13.6kg or 30lb) 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.

1.10 BUILDING SEWER

The 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. The **Manufacturer** shall be Orenco or approved equal. The **Manufacturer** or **Manufacturer's Representative** shall supply detailed installation, operation, and maintenance instructions and warranty terms to **Engineer**. The **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 the **Engineer** and in accordance with all applicable regulations.

B. Loading criteria:

1. The tank shall be rated for a minimum 2441kg/m^2 (500lb/ft^2) loading criteria, based on a saturated backfill of 2243kg/m^3 (140lb/ft^3) and an unsaturated backfill of 1922kg/m^3 (120lb/ft^3).
2. Minimum lateral loading shall be 1000kg/m^3 (62.4lb/ft^3). Lateral loading shall be determined from ground surface.
3. The tank shall support a concentrated wheel load of 1134kg (2500lb).

C. There are four typical loading conditions to analyze:

1. 1.5m (5ft) bury + full exterior hydrostatic load
2. 1.5m (5ft) bury + full exterior hydrostatic load +2500lb (1134kg) wheel load
3. 0.3m (1ft) bury +1134kg (2500lb) wheel load

4. Interior hydrostatic load with tank full and unsupported by soil. This condition represents the tank full of liquid at 1000kg/m^3 (62.4lb/ft^3). It addresses seam and haunch stress-strain relationships that occur during watertightness testing, as well as poor soil bedding conditions that provide inadequate support.

D. A minimum soil cover of 305mm (12in) shall be used, unless specified otherwise by the **Manufacturer**. Tanks requiring deep burial (> 1524mm or 60in) or subject to truck or heavy traffic loading require special consideration.

E. All tanks shall be designed to be structurally sound and watertight and shall be warrantied in writing by the **Manufacturer** for a period of five (5) years from the date of invoice. The **Manufacturer**'s warranty, including any and all limitations and exclusions, shall accompany the **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 (1) access opening capable of accepting an NPS 30in diameter access riser of the configuration shown on the **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 457mm (18in) 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 the **Manufacturer**'s specifications.

I. All tanks shall be installed in strict accordance with the **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 bar (psi)	159 (2300)
2.	Design flexural strength bar (psi)	241 (3500)
3.	Design compressive strength bar (psi)	214 (3100)
4.	Design shear in-plane bar (psi)	165 (2400)
5.	Flexural modulus bar (psi)	18,892 (274,000)

L. The tank shall be molded from thermoset 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 the **Manufacturer**'s engineer (e.g., 197kg ± for 3800L tanks or 435lbs ± for 1000gal tanks).

N. All penetrations specified for the tank shall be provided by the **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. 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 50mm (approximately 2in) 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 the **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

The Riser **Manufacturer** shall be Orenco. 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 76mm (3in) 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 shall supply all risers, lids, and attachment components.

3.02 SECONDARY SAFETY BARRIER

All risers shall be equipped with an Orenco Model RTS24 or RTS30 Tank Shield® secondary safety barrier or **Engineer**-approved equal. Secondary safety barriers shall be constructed of copolymer polypropylene and shall demonstrate supporting a 113kg (250lb) weight load.

3.03 LIDS

One (1) lid shall be furnished with each access riser. Lids shall be an Orenco DuraFiber® Model FLD24G or FLD30G, an Orenco FiberLast® Model FLL24G, or **Engineer**-approved equal, as appropriate, made of fiberglass, and provided with stainless steel bolts. Lids shall be waterproof, corrosion resistant, and UV resistant. Lids shall be flat, with an allowable crown or dome of no more than 6.4mm (1/4in). Lids shall not allow water to pond on them. Lids shall have a nonskid finish. Self-lubricating plastics, such as polyethylene, shall not be considered nonskid without the addition of a nonskid coating. Lids shall be capable of making a watertight seal with the top of the riser. Lids shall be rated for non-traffic loads up to 1134kg (2500lbs). The **Manufacturer** shall be able to provide evidence that lid will withstand a 1134kg (2500lb) load applied over a 229mm × 229mm (9in × 9in) area for 30 minutes with no more than 19mm (3/4in) deflection, as well as demonstrating a one-minute proof load of 2268kg (5000lbs) without permanent deformation. Lids shall have the option of stainless steel fasteners with a recessed hex drive and removal tool. Optional components may include the following:

A. Traffic-bearing lid: The traffic-bearing lid shall be a cast iron frame and cover which will fit over a standard lid. The cover shall have the word "SEWER" cast into it.

B. Foam insulation: Rigid closed-cell foam insulation of 51mm (2in) or 102mm (4in) 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 RSI ≥1.8 (R-value ≥10) per 51mm (2in) increment.

3.04 RISER INSTALLATION

Riser installation shall be accomplished according to the **Manufacturer**'s instructions.

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 effluent sewers. Effluent filters shall prevent particles larger than 3mm (1/8in) 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

Biotube PSC-Series Effluent Filter

An Orenco Model PSC06 Biotube Effluent Filter or **Engineer**-approved equal shall be installed in **PGED** tanks for single-family dwellings of fewer than four bedrooms. The filter shall consist of an NPS 6in diameter PVC vault. The Biotube cartridge shall be

made with 3mm (1/8in) mesh polypropylene and have a deflector plate installed at the base. The Biotube filter cartridge shall be housed inside the PVC vault. The filter shall have an effective filter area of no less than 0.59m^2 (6.3ft^2). The filter shall be installed in conformance with the **Engineer**'s plans. 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

Biotube FT-Series Commercial Effluent Filter

Commercial and multiple-user tanks require larger effluent filters, the sizes of which must be individually determined and spelled out in the specifications. Commercial applications should be sized according to the Orenco document *Biotube Effluent Filter Sizing Design Aid*, NDA-FT-FT-1.

A. **Alternate: 8in (200mm) Effluent Filter**

An Orenco Biotube FT-Series Model FT08 effluent filter or **Engineer**-approved equal shall be installed in commercial and multiple-user tanks. The filter shall consist of an 200mm (8in) nominal diameter PVC vault with eight (8) 35mm (1.375in) diameter holes evenly spaced around the perimeter, located appropriately to allow for maximum sludge and scum accumulation (approximately 70% of minimum liquid level) before requiring pumping. The Biotube cartridge shall be made with 3mm (1/8in) mesh polypropylene and have 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 then 1.36m^2 (14.6ft^2). The filter shall be installed in conformance with the **Engineer**'s plans.

B. **Alternate: 12in (300mm) Effluent Filter**

An Orenco Biotube FT-Series Model FT12 effluent filter or **Engineer**-approved equal shall be installed in commercial and multiple-user tanks. The filter shall consist of a 300mm (12in) nominal diameter PVC vault with eight (8) 35mm (1.375in) diameter holes evenly spaced around the perimeter, located appropriately to allow for maximum sludge and scum accumulation (approximately 70% of minimum liquid level) before requiring pumping. The Biotube cartridge shall be made with 3mm (1/8in) mesh polypropylene and have 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 2.8m^2 (30ft^2). Optional NPS 4in PVC slide rail for easy removal of vault housing is available. The filter shall be installed in conformance with the **Engineer**'s plans.

4.04 ALARM FLOAT SWITCH (OPTIONAL)

Float switch shall be mercury-free Orenco Model MF1P, 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 Model SBEX series or **Engineer**-approved equal, UL-approved for wet locations, equipped with up to five (5) electrical cord grips and two (2) 19mm (3/4in) 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 RSI value rating of 0.88 per 25.4mm (R-value rating of 5 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 232°C (450°F).

4.06 ALARM PANEL (OPTIONAL)

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

A. Enclosure: Measures 152mm (6in) high × 152mm (6in) wide × 102mm (4in) deep, UL Type 4X (IP 66)

B. Audio Alarm: 95dB at 610mm (24in), warble-tone sound, gasketed, UL Type 4X (IP 66)

C. Visual Alarm: 22mm (7/8in) diameter red lens, push-to-silence, UL Type 4X, 1W LED bulb, 230VAC

D. Audible Alarm Silence Relay: 230VAC, automatic reset

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

5.01 PRELOS PROCESSOR PUMPING SYSTEM

The **Prelos Processor** pumping system is an integrated package designed specifically for use in the **Prelos Processor** tank. The **Manufacturer** of the complete, integrated system shall be Orenco 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 1.3m^2 (14ft^2). 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 pump shall be a submersible, high-head Prelos pump. Unless specified otherwise by the **Engineer**, the pump shall be an Orenco Model PF(50HZ)100512CV, 0.37kW (1/2hp), 230VAC, single-phase, 50Hz, two-wire motor, with 3m (10ft), extra-heavy-duty (SOOW) electrical cord with ground, terminating in a ClickTight-compatible plug. The plug shall be a glass-filled thermoplastic with a silicone gasket, triple-pole, and a max load of 13A at 240V. The pump discharge shall be capable of delivering 0.25L/sec (4gpm) at a pressure of 46m (151ft) and 0.63L/sec (10gpm) at a pressure of 24m (79ft), with a shutoff head of 53m (174ft). When used in conjunction with a flow controller, the pump shall be capable of providing 0.25L/sec (4gpm) against a head of 43m (141ft). 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 3mm (1/8in) 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 I and Division 1 and 2 applications. The pump shall be lightweight (less than 14kg or 30lb) for easy removal and maintenance. The pump intake screen must be 3mm (1/8in) 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 Model HDAS30125FCASLC hanging-style discharge assembly or **Engineer**-approved equal. Discharge assembly shall be NPS 1 1/4in diameter and include an anti-siphon mechanism, flow control disc, and high-pressure reinforced EPDM flex hose with working pressure rating of 17.24bar (250psi), 32mm (1 1/4in) quick-disconnect, line check valve, and stainless steel pipe.

D. Float switches shall be mercury-free, Orenco Model MF2P with two (2) 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 plug. The plug shall be glass-filled thermoplastic with a silicone gasket, double-pole, and rated for 1.0A at 230VAC. 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 1.0A at 230VAC.

E. The wiring connection system shall be Orenco Model CLK2-60 or **Engineer**-approved equal. The wiring connection system shall be pre-wired with 19m (62ft) of direct burial PVC/nylon cable, with 14AWG wire for the pump and 18AWG wire for the float switches. The housing shall be ABS, UL listed for wet locations, and capable of accepting active connections to two (2) float switches and another input connector capable of accepting an active connection to one (1) pump.

F. 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 Model S2(50Hz)HR series with a high water redundant ON/OFF feature or an **Engineer**-approved equal control panel that includes the following:

Standard Components:

1. Motor-Start Contactor: 230VAC, 1.5kW (2hp), 9A, 50Hz, 2.5 million cycles at FLA (10 million at 50% of FLA)
2. Toggle Switch: Single-pole, double-throw HOA switch, 20A, 0.75kW (1hp)

3. Controls Circuit Breaker: 10A, OFF/ON switch, single-pole 230VAC, DIN rail mounting with thermal-magnetic tripping characteristics
4. Pump Circuit Breaker: 20A, OFF/ON switch, single-pole 230VAC, DIN rail mounting with thermal-magnetic tripping characteristics
5. Audio Alarm: 95dB at 610mm (24in), warble-tone sound
6. Visual Alarm: 22mm (7/8in) diameter red lens, push-to-silence, UL Type 4X, 1W LED bulb, 230VAC
7. Panel Enclosure: 292mm (11.5in) high x 236mm (9.3in) wide x 137mm (5.4in) deep, UL Type 4X rated or Type 3R when using a generator receptacle, constructed of UV-resistant fiberglass, stainless steel hinges and latch
8. S2(50Hz)HR Panel Ratings: 230VAC, 0.75kW (1hp), 14A, single-phase, 50Hz

Optional Components:

1. Redundant-Off Relay: 230VAC, secondary off, sounds alarm on low-level condition, DIN rail mount
2. Pump Run Light: 22mm (7/8in) green lens, UL Type 4X, 1W LED bulb, 230VAC
3. Flashing Light: red polycarbonate lens, flange based, UL recognized
4. Intrinsically Safe Controls Relays (larger enclosure required): 230VAC, UL 913 listed; for Class I Division 1 Groups A, B, C, and D hazardous locations
5. Power Light: 22mm (7/8in) green lens, UL Type 4X, 1W LED bulb, 230VAC
6. Heater: Anti-condensation, self-adjusting (radiates additional wattage as temperature drops)
7. 3-Way (main, auto, off) Manual Transfer/Disconnect Switch
8. Generator Receptacle
9. Event Counter: 230VAC, 6-digit, non-resettable
10. Elapsed Time Meter: 230VAC, 7-digit, non-resettable, limit of 99,999 hours, accurate to 0.01 hours
11. Larger Panel Enclosure (as required): size to be determined by the **Manufacturer**

5.02 INSTALLATION

All pumping system components shall be installed in accordance with the **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 15.2m (50ft) 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 (1.2-1.5m or 4-5ft above final grade) and where it will be accessible for maintenance.

PART 6. PPED SYSTEM FOR COMMERICAL CONNECTIONS

The collection system on-lot package shall be certified to have been manufactured by Orenco or **Engineer**-approved equal. The Discharge System shall be a **Prelos Processor** Pumping System as specified in 5.01 PRELOS PROCESSOR PUMPING SYSTEM, unless specified as a Biotube Pumping System on the plans or in the specification.

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 used when specifically called for in the plans and specifications. The **Manufacturer** of the complete, integrated system shall be Orenco, and shall provide the following integrated components as part of the system:

A. The pump vault shall be an Orenco Biotube Pump Vault, Model PVU-Series (Biotube Universal Pump Vault) or PVP-Series, installed in conformance with the **Engineer**'s plans. The filter shall have a minimum effective screen area of no less than 1.3m^2 (14.5ft^2). The PVU-Series pump vault shall include eight (8) 51mm (2in) 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 PVP-Series pump 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. The Biotube assembly, consisting of 3mm (1/8in) mesh polypropylene tubes, shall be housed inside the polyethylene vault. Attached to the vault is a flow inducer to accept one (1) or two (2) high-head Prelos pumps. Alternatively, the Prelos Biotube pump vault may be used in accordance with 5.01 PRELOS PROCESSOR PUMPING SYSTEM, if approved by the **Engineer** or shown in the design plans.

B. All pumps shall comply with general requirements set forth in 5.01 PRELOS PROCESSOR PUMPING SYSTEM. All commercial applications shall use duplex (2-pump) pumping systems for redundancy, unless specified otherwise by the **Engineer**. Pump shall be Orenco Model PF(50HZ) series high-head pump, __kW, 230VAC, single-phase, 50Hz, two-wire motor, with 3m (10ft), extra heavy-duty (SOOW) electrical cord with ground. Pump shall be capable of delivering __L/sec at a pressure of __m, __L/sec at __m, and __L/sec at __m. 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 3mm (1/8in) 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 I Division 1 and 2 applications. Pump shall be lightweight for easy removal and maintenance. Pump intake screen must be 3mm (1/8in) 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 Model HDAD30125CASLC hanging-style discharge assembly or **Engineer**-approved equal. Discharge assembly shall be NPS 1 1/4in diameter and include a bronze check valve, anti-siphon mechanism, and high-pressure reinforced EPDM flex hose with working pressure rating of 17.24bar (250psi), 32mm (1 1/4in) EZ pull quick-disconnect, line check valve, and Schedule 80 stainless steel pipe.

D. Float switches shall be mercury-free Orenco Systems, Inc., Model MF4P with four (4) 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 Model SBEX series external splice box or **Engineer**-approved equal, UL approved for wet locations, equipped with up to five (5) electrical cord grips and two (2) 19mm (3/4in) 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, quick-drying polyurethane foam or **Engineer**-approved equal with an RSI rating of 0.88 per 25.4mm (R-value of 5 per inch) of foam.
- UL-classified silicone sealant or **Engineer**-approved equal consisting of a neutral-cure, non-acetic, non-corrosive silicone able to withstand temperatures to 232°C (450°F).

Alternate: Class I, Division 1 Splice Box

The Class I, Division 1 splice box shall be Orenco Model SBX or **Engineer**-approved equal. The Splice box must be UL approved for Class I, Division 1 Group D gas applications and be equipped with one (1) quick-disconnect, aluminum receptacle, and a 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 Eaton Crouse-Hinds Chico® A sealing compound.

F. Controls and Alarms

The control panel shall be Orenco MVP-Duplex. Controls and alarms shall be listed per UL 508. The panel shall be repairable in the field without the use of soldering irons or substantial disassembly. The panel shall meet the following requirements:

Standard Components:

1. Programmable Logic Unit: 230VAC, built-in LCD screen and programming keys, providing control functions and timing, if necessary, for panel operation
2. Motor-Start Contactor: 230VAC, 9 FLA, 1.5kW (2hp), 50Hz, 2.5 million cycles at FLA (10 million at 50% FLA)
3. Toggle Switch: Single-pole, double-throw HOA switch, 20A, 0.75kW (1hp)
4. Controls Circuit Breaker: 10A, OFF/ON switch, single-pole 230VAC, DIN rail mounting with thermal-magnetic tripping characteristics
5. Pump Circuit Breaker: 20A, OFF/ON switch, single-pole 230VAC, double-pole 230VAC, DIN rail mounting with thermal-magnetic tripping characteristics, power supplied by a 30A breaker
6. Audio Alarm: 95dB at 610mm (24in), warble-tone sound
7. Visual Alarm: 22mm (7/8in) diameter red lens, push-to-silence, UL Type 4X, 1W LED bulb, 230VAC
8. Enclosure: UL Type 4X rated or Type 3R when using generator receptacles with stainless steel hinges, latch, and conduit couplings provided

Optional Components:

1. Pump Run Light: 22mm (7/8in) green lens, UL Type 4X, 1W LED bulb, 230VAC
2. Power Light: 22mm green lens, UL Type 4X, 1W LED bulb, 230VAC
3. Flashing Light: Red, polycarbonate lens, flange based, UL recognized
4. 3-Way (main, auto, off) Manual Power Transfer/Disconnect Switch
5. Generator Receptacle
6. Heater: Anti-condensation, self-adjusting (radiates additional wattage as temperature drops)
7. Intrinsically Safe Controls Relays (larger enclosure required): 230VAC; listed per UL 913; for Class I, Division 1, Groups A, B, C, and D hazardous locations
8. Current Sensor: 230VAC, 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 the **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 15.2m (50ft) 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 (1.2-1.5m or 4-5ft above final grade) where it will be accessible for maintenance.

6.04 SERVICE CONNECTION

The service connection shall be Orenco Model SC100 NPS 1in, SC125 NPS 1.25in, SC150 NPS 1.5in, or SC200 NPS 2in 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 10.34bar (150psi).

A. Service connection shall be enclosed in PVC access riser as manufactured by Orenco or **Engineer**-approved equal. Risers shall extend to 76mm (3in) above the ground surface to allow for settlement and shall have a minimum nominal diameter of 200mm (8in).

B. One (1) lid shall be furnished with each access riser. Lids shall be Orenco 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 AND 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. The valve will also include a polypropylene elbow to expel air horizontally. The valve shall be corrosion resistant and operable with a minimum line pressure of 0.21bar (3psi).

A. The piping shall be Orenco Model ARA or **Engineer**-approved equal. The piping shall be constructed of Schedule 40 PVC and include a 25mm (1in) nominal diameter PVC isolation valve, a 25mm (1in) diameter PVC ball valve for bypass, and a pressure gauge connection. All components shall be rated for 10.34bar (150psi) working pressure.

B. Air-release assembly shall be enclosed in a 750mm (30in) diameter access riser as manufactured by Orenco or **Engineer**-approved equal. The material shall be fiber-reinforced polymer (FRP). Risers shall extend to 76mm (3in) above the ground surface to allow for settlement and shall have a minimum nominal diameter of 750mm (30in). A 1200mm x 1200mm x 100mm (48in x 48in x 4in) thick concrete apron shall be poured around the FRP riser. FRP access risers are not intended for traffic areas.

C. Lids shall be Orenco DuraFiber Model FLD30G, or **Engineer**-approved equal, as appropriate, made of FRP, and provided with stainless steel mounting hardware and meeting the requirements as stated in 3.03 LIDS.

7.02 MANUAL VALVES

The valve shall be Orenco 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 25mm (1in) diameter PVC isolation valve, a 25mm (1in) diameter PVC ball valve for bypass, and a pressure gauge connection. All components shall be rated for 10.34bar (150psi) working pressure and allow the installation of a combination air/vacuum release valve.

B. Manual valve assembly shall be enclosed in a 750mm (30in) diameter access riser as manufactured by Orenco or **Engineer**-approved equal. The material shall be FRP. Risers shall extend to 76mm (3in) above the ground surface to allow for settlement and shall have a minimum nominal diameter of 750mm (30in). A 1200mm x 1200mm x 100mm (48in x 48in x 4in) thick concrete apron shall be poured around the FRP riser. FRP access risers are not intended for traffic areas.

C. Lids shall be Orenco DuraFiber Model FLD30G, or **Engineer**-approved equal, as appropriate, made of FRP, and provided with stainless steel mounting hardware and meeting the requirements as stated in 3.03 LIDS.

7.03 FORCE MAIN TESTING

A. The **Contractor** shall adhere rigorously to all hydrostatic testing procedures and requirements. Leakages should not exceed what is allowable by American Water Works Association (AWWA) standards. 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 ± 0.34bar (± 5psi) of test pressure.
4. Accurately record time, pressure readings, and amount of leakage.
5. Determine whether these leakages are in the allowable range. Refer to the *AWWA Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances* C600-93, Section 4: Hydrostatic Testing.

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.

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 the **Owner**, **Contractor**, **Engineer**, and **Manufacturer** or **Manufacturer's Representative**(s) (or their agents) 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, the **Owner**, **Contractor**, **Engineer**, and **Manufacturer** or **Manufacturer's Representative** 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. The **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 the **Manufacturer**'s recommendations and requirements. The **Manufacturer** or **Manufacturer's Representative** shall have a trained representative provide installation and training services for a minimum of one (1) visit consisting of 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 the **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 the **Inspector** and accepted by the **Engineer**.

8.03 QUALITY CONTROL

A. To ensure quality control, the **Inspector** shall inspect and certify that an initial installation of each **Prelos Sewer** unit is in compliance with the **Manufacturer**'s recommendations and requirements, using the form provided in APPENDIX A, PRELOS 50Hz SEWER INSTALLATION CHECKLIST. The **Manufacturer** or **Manufacturer's Representative** shall provide the services of a trained representative for a minimum of one (1) visit consisting of a minimum of one (1) eight-hour day for the purpose of quality control during construction.

B. Upon completion of the inspection, the **Inspector**, in coordination with the **Engineer**, shall perform or direct the **Contractor** to perform any required adjustments to the equipment and place it into operation under the supervision of the **Engineer**. All equipment and materials required to perform the testing shall be the responsibility of the **Contractor**. The completed inspection checklist shall be signed by the **Inspector** and copies faxed, emailed, or mailed to the **Engineer** and

Manufacturer(s) within ten (10) days of each corresponding Prelos Sewer unit being installed and prior to system commissioning.

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 50Hz SEWER INSTALLATION CHECKLIST, as well as the Prelos package, wiring, and control panel placement.

B. The Manufacturer or Manufacturer's Representative shall provide the services of a trained representative for a minimum of one (1) visit consisting of a minimum of one (1) eight-hour day for the purpose of system commissioning.

C. Upon system commissioning, the Manufacturer or Manufacturer's Representative shall provide the Engineer a written report of findings. The Engineer should then perform, or direct the 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 the Contractor.

PART 9. OPERATION AND MAINTENANCE

9.01 OPERATION AND MAINTENANCE MANUAL

The Manufacturer shall provide an electronic copy of the operation and maintenance manual in addition to five (5) print copies: four (4) to be sent to the Owner, and one (1) to be sent to the Engineer. The operation and maintenance manuals shall include a copy of APPENDIX A, PRELOS 50Hz SEWER INSTALLATION CHECKLIST signed by the Inspector for each Prelos Sewer installation.

9.02 SPARE PARTS

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

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) 10A circuit breaker for every 50 Prelos Processors installed

E. Two (2) 20A circuit breakers for every 50 Prelos Processors installed

F. One (1) motor-start contactor for every 50 Prelos Processors installed

G. Three (3) EPETMCT 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: Upon request, the Manufacturer shall provide a minimum of one (1) scum measuring utility gauge. The gauge shall be a minimum of 10mm (3/8in) in 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 Model SMUG or Engineer-approved equal.

B. Sludge Measuring Device: Upon request, the Manufacturer shall provide a minimum of one (1) Nasco Sludge Judge® Ultra or Engineer-approved equal. The unit shall be constructed of polycarbonate treated with an ultraviolet stabilizer, durable in cold temperatures, and able to withstand heat up to 138°C (280°F). The measuring device shall be 19mm (3/4in) diameter and marked with tape to designate 1ft increments.

C. Biotube Cartridge Cleaning Brush: Upon request, the Manufacturer shall include a minimum of one (1) Biotube cartridge cleaning brush. The brush shall be Orenco Model OM-BIOTUBE BRUSH or Engineer-approved equal for cleaning Biotube pump vault filter cartridges.

D. Hanging Discharge Removal Hook: Upon request, the **Manufacturer** shall include a minimum of one (1) Hanging Discharge Removal Hook. Hook shall be Orenco Model OM-HDA-TOOL or **Engineer**-approved equal for removing hanging pump assemblies from vaults.

APPENDIX A

PRELOS 50Hz 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 septic tank, recirculation tanks, pump basins, AdvanTex system, sewer piping, drainfield, etc. Include dimensions. If necessary, attach separate drawings.

Yes	No	Preinstallation	Date/Initial
		Tank location approved per **Engineer**	
		Panel location approved per **Engineer**	
		Electrical supply (# circuits/disconnect) checked	
		Prelos Sewer equipment package reviewed and approved	
		Service connection located	
		Riser-to-tank connection and piping-to-tank method reviewed	
		Tank warranty received	
		Date of manufacture specified	
		Inlet connection approved	
		Inlet tee installed	
		Riser-to-tank connections approved	
		Tank level checked and tank properly bedded	
		Leak test/watertight test (tank filled 51mm or 2in 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	
		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 76mm or 3in 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: _____ ***Date:*** _____

END OF SECTION