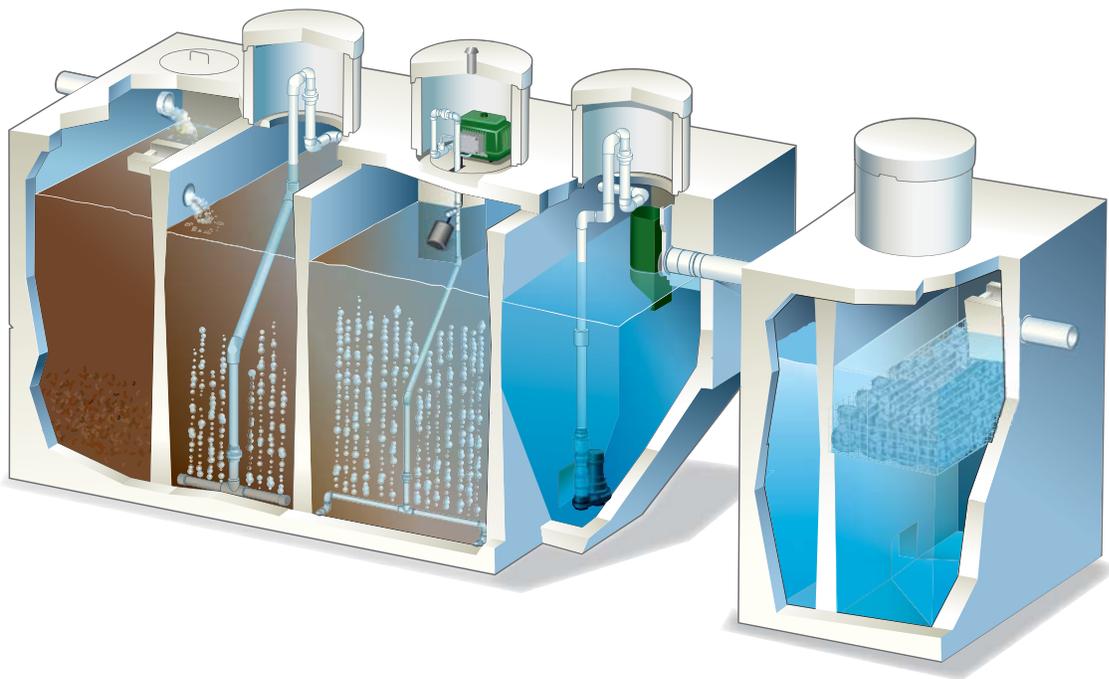


# HYDRO-KINETIC®

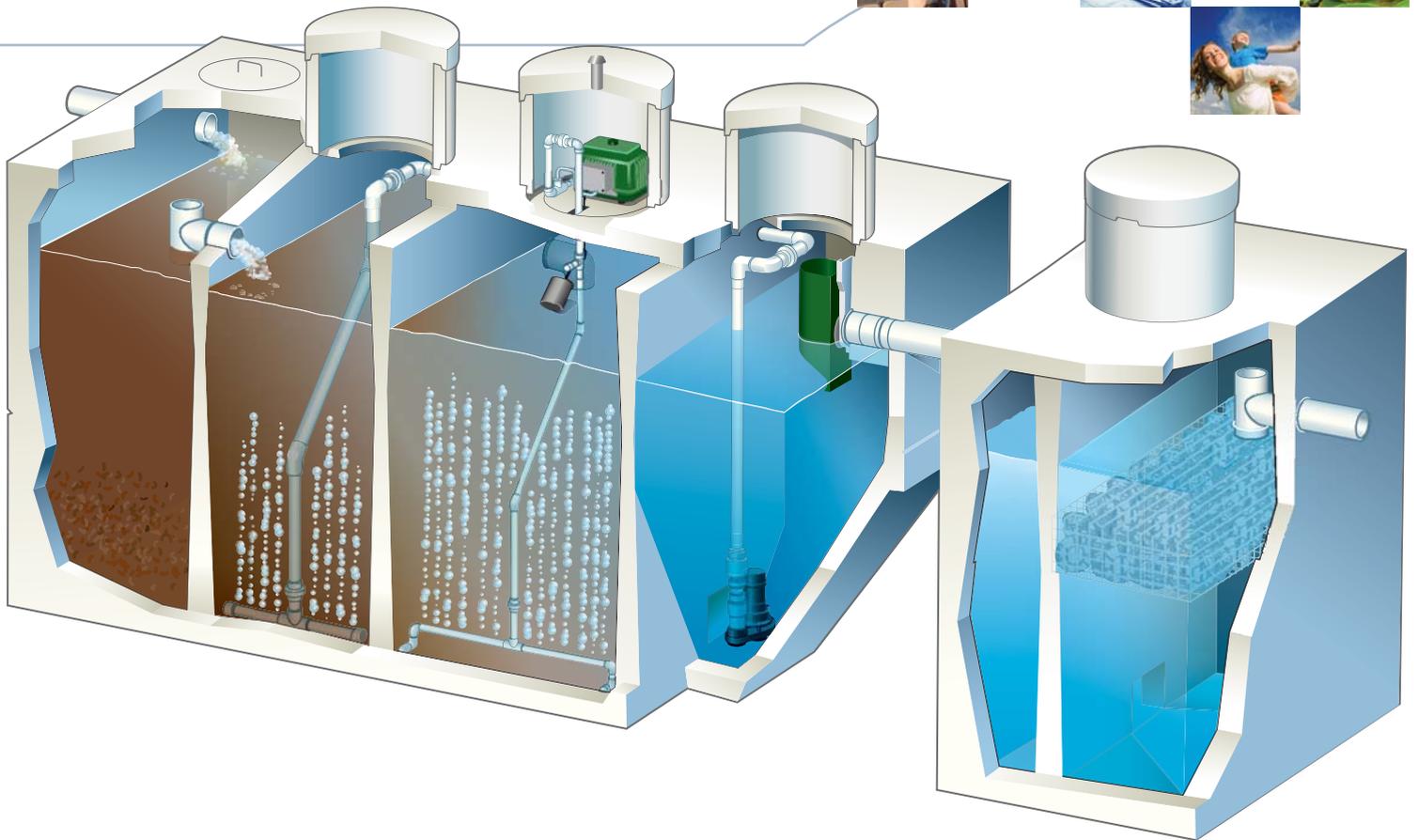
## INDIVIDUAL HOME WASTEWATER TREATMENT PLANT



PRODUCT MANUAL

PROGRESS THROUGH *norweco*® SERVICE SINCE 1906

# HYDRO-KINETIC® FEU



***norweco***®

*Engineering the future of water  
and wastewater treatment*

TOXIC CHAMBER RISER  
TESTING WITH LID

TRANSFER TEE

IMPROVED SEALANT  
SEALING DEVICE

# HYDRO-KINETIC®

A revolutionary wastewater treatment system that employs innovative Hydro-Kinetic® filtration technology to produce the cleanest, most consistent effluent quality available

During its successful completion of both NSF/ANSI Standard 40 and 245 tests, the Hydro-Kinetic FEU system:

- Became the only NSF/ANSI Standard 40 and 245 certified residential wastewater treatment system to pass two consecutive back-to-back tests without performing routine maintenance for a full 12 months.
- Achieved unmatched effluent results of 2.1 mg/L CBOD (Carbonaceous Biochemical Oxygen Demand), 1.8 mg/L TSS (Total Suspended Solids) and 7.95 mg/L TN (Total Nitrogen).

It quietly, efficiently and automatically pretreats, aerates, flow equalizes and filters all wastewater returning only the purest effluent back to the receiving environment. Better yet, all treatment processes are managed by reliable components and user friendly controls. The integrity of the treatment process is protected by our patented non-mechanical, demand use flow equalization device, as well as our revolutionary Hydro-Kinetic filter.

solutions in wastewater treatment

SOLVENT WELD CONNECTION

4" DIAMETER TRANSFER PIPE

POLISHING MEDIA

POLISHING CHAMBER

INFLUENT CHAMBER

CLARIFICATION CHAMBER

MODEL SD103 RECIRCULATION PUMP

CAST-IN AERATION  
CHAMBER TRANSFER PORT

TREATMENT CHAMBER

TOXIC CHAMBER

NG B

CEDED TRANSFER PORT



Norweco distributors are located throughout the United States and much of the rest of the world. Research, product development, manufacturing, marketing and sales support are conducted inside our offices and factory in Norwalk, Ohio USA. Everyone at Norweco is committed to shaping the future of our industry.

engineering

the future

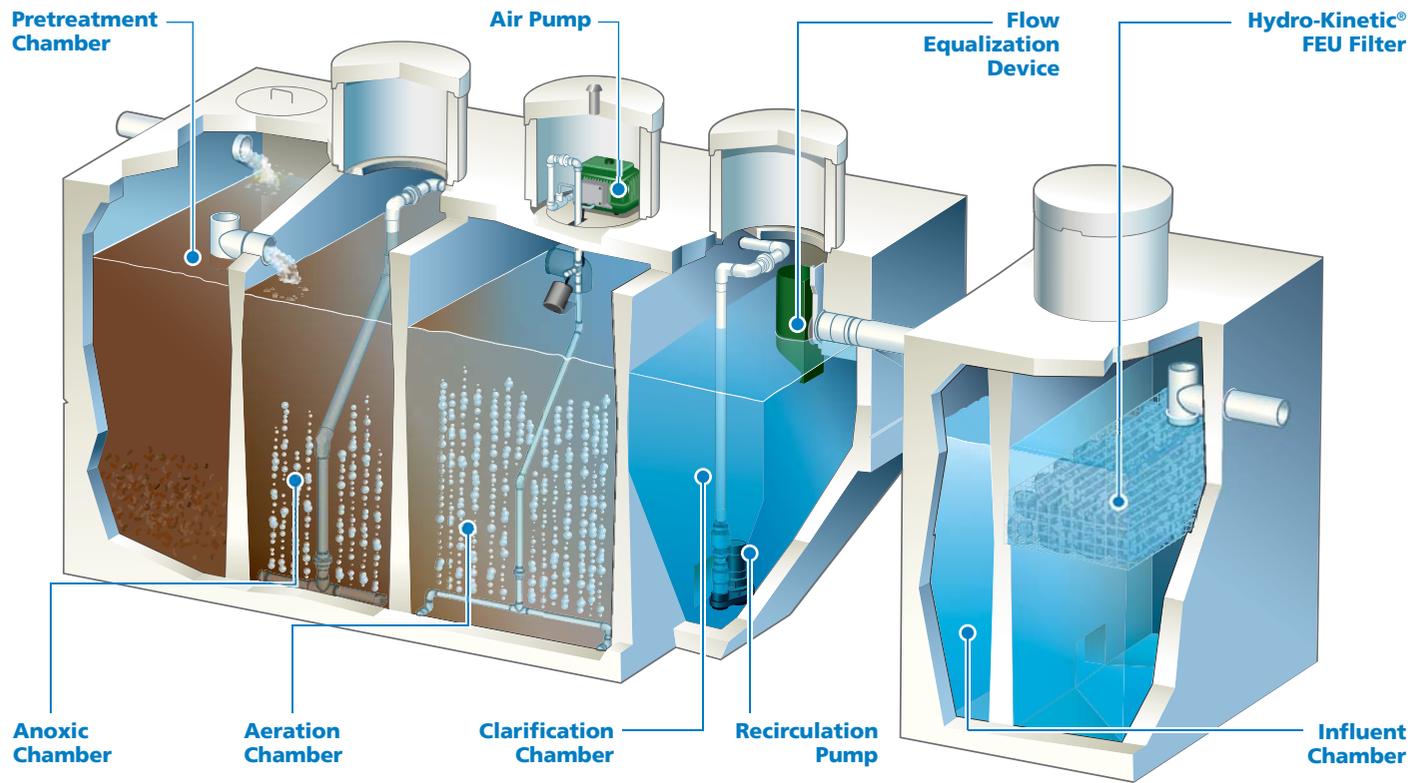
of water and wastewater treatment

## Specify Hydro-Kinetic®

As a designer, choosing to incorporate the Hydro-Kinetic system in your project will insure that you achieve successful treatment while offering outstanding quality and reliability. At the same time, the reputation of your company will be protected for years to come. Your local Norweco distributor is fully trained to assist you in the design, installation and operation of a Norweco Hydro-Kinetic FEU (Flow Equalized Upflow) system.

As a homeowner, getting the highest quality product is essential. The Hydro-Kinetic system arrives to the jobsite complete, including delivery, tank setting, equipment installation, plant start-up and service. A series of service and adjustment inspections are prescheduled for the first two years of operation at the time your system is installed. These inspections are included in the sale so that your system continues to perform at the highest level to protect you and your investment. Extended service contracts are also available from your local Norweco distributor.

# Revolutionary in design, unparalleled in performance



## Pretreatment Chamber

Anaerobic bacteria and gravity precondition the wastewater here to protect the integrity of downstream treatment processes.

## Anoxic Chamber

Pretreatment Chamber effluent is mixed with nitrified liquid recirculated from the clarifier in measured doses, via a mixing bar in this chamber. Under carefully controlled conditions, bacteria remove nitrogen by consuming nitrate-bound oxygen during their respiratory process.

## Aeration Chamber

Here, safe, living aerobic bacteria convert the wastewater into stable substances. Flow equalization maximizes this biological oxidation and assures proper retention and treatment.

## Model A100 Air Pump

Our exclusive Model A100 air pump is a precision engineered electro-mechanical device that has been specifically designed for use in the system. It can be installed below grade or remotely located up to 75 feet from the system.

## Clarification Chamber

Flow equalization enhances the settling of biologically active substances inside the Clarification Chamber. Pretreated, aerated wastewater has now been converted to clarified liquids for discharge from this chamber.

## Model SD103 Recirculation Pump

This highly efficient recirculation pump is installed at the bottom of the Clarification Chamber and is used to transfer nitrified liquid back to the Anoxic Chamber for denitrification.

## Flow Equalization Device

Controls flow through the treatment process and regulates the velocity of treated effluent that can leave the system, enhancing the efficiency of the attached growth filtration media in the Hydro-Kinetic system.

## Hydro-Kinetic® FEU Filter

Flow equalized liquid from the clarifier enters the Hydro-Kinetic filter where it flows downward and is evenly distributed beneath our exclusive Hydro-Kinetic filtration media. The liquid then travels through the proprietary attached growth filtration media where the final treatment takes place.

## Precast Concrete Tank

Every tank is constructed of high quality, non-corrosive materials under rigid quality control standards. The tank, access risers and covers are reinforced precast concrete manufactured locally by your licensed Norweco distributor.

## AT 1500 Ultraviolet Disinfection System

CAPABLE OF MEETING EVEN THE MOST STRINGENT ENVIRONMENTAL REQUIREMENTS, THE MODEL AT 1500 UV DISINFECTION SYSTEM REDUCES BACTERIA LEVELS FROM SECONDARY EFFLUENT TO MEET STRICT WATER QUALITY STANDARDS. THE AT 1500 IS THE ONLY UV TREATMENT SYSTEM LISTED BY UNDERWRITERS LABORATORIES FOR RESIDENTIAL APPLICATIONS.



## Consider the facts:

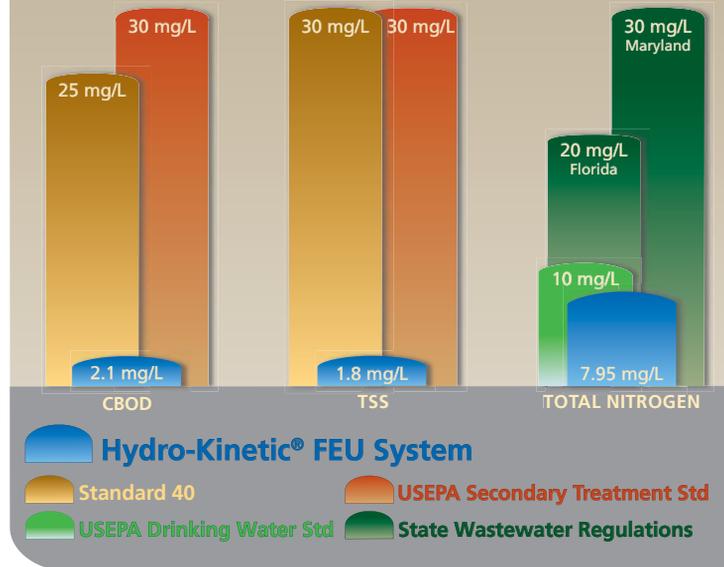
- The Hydro-Kinetic FEU system meets or exceeds regulatory standards and is performance certified and listed by NSF International to Standards 40 and 245. The system achieved an astounding effluent quality of 2.1 mg/L CBOD, 1.8 mg/L TSS and 7.95 mg/L TN.
- The system produced these unmatched effluent results while being tested for 12 continuous months without service. The Hydro-Kinetic system passed two consecutive 6 month tests with flying colors, including duplicate multi-stress sequences.
- We have engineered the Model A100 air pump to maximize operational efficiency and increase service life. It requires minimal electricity to operate and utilizes a standard 115V power connection. Multiple air pump mounting locations are available.
- The Model SD103 recirculation pump features a 1/3 horsepower electric motor that is securely mounted in an oil-filled, watertight, corrosion resistant housing with lubricated ball bearings to assure long life. The recirculation pump features a 2" discharge connection.
- The Hydro-Kinetic FEU filter provides final treatment of the wastewater to a near pristine state. As liquid flows up through our proprietary attached growth filtration media, final polishing takes place insuring only the highest quality effluent is safely returned to the environment.



### SERVICE PRO® Model 801P

EVERY SYSTEM COMES WITH THE SERVICE PRO MODEL 801P CONTROL CENTER THAT USES MCD TECHNOLOGY TO PROVIDE MONITORING, COMPLIANCE AND DIAGNOSTIC FUNCTIONS FOR THE TREATMENT SYSTEM. EACH CONTROL CENTER INCLUDES A TIME CLOCK, ALARM LIGHT, RESET BUTTON, POWER SWITCH, POWER LIGHT, PHONE/NETWORK LIGHT, RECIRCULATION PUMP ALARM, AIR PUMP ALARM, HIGH WATER ALARM AND ADDITIONAL AUXILIARY COMPONENT INPUT.

## Unmatched Effluent Results



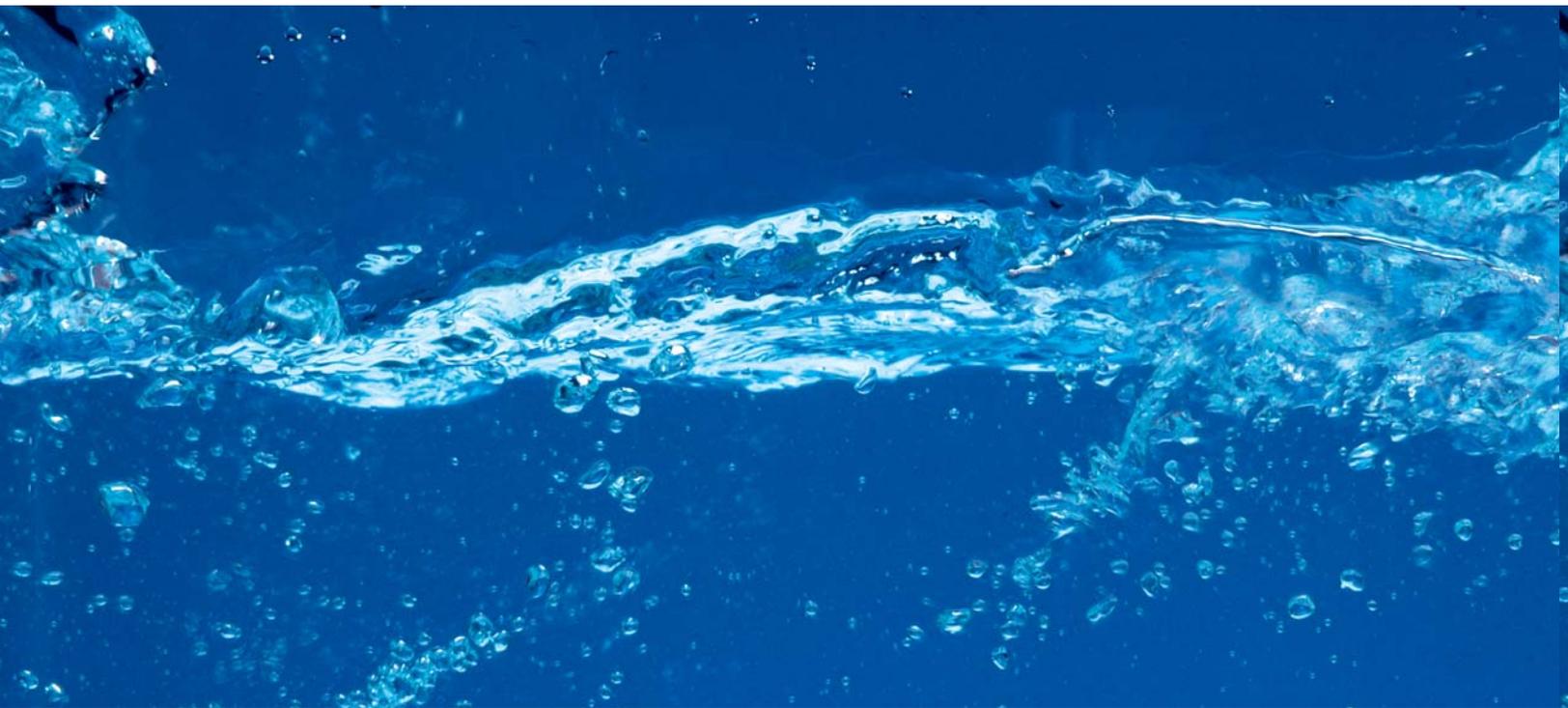
- 70-hour retention in the Hydro-Kinetic system insures adequate exposure to all treatment processes and reduces pumping frequency as compared to smaller capacity systems.
- Our patented non-mechanical flow equalization device guarantees that all incoming wastewater is fully treated, regardless of heavy use periods.
- All flow is equalized an average of 50% at the NSF Standard 40/245 600 GPD (gallons per day) design loading pattern.
- Durable, reliable components are safely installed out-of-sight below grade. No exposed power cords or air lines that are above ground.
- Your local licensed Norweco distributor sells, installs and services your Hydro-Kinetic system with pride. You'll find their name and contact info conveniently posted on the system's control center.



### Blue Crystal® Residential Disinfecting Tablets and Bio-Max® Dechlorination Tablets

PURE CALCIUM HYPOCHLORITE TABLETS FORMULATED FOR USE IN RESIDENTIAL SYSTEMS, BLUE CRYSTAL TABLETS CONTAIN 70% AVAILABLE CHLORINE TO PROVIDE EFFICIENT, RELIABLE DISINFECTION. BIO-MAX TABLETS PROVIDE A CONVENIENT SOURCE TO INSTANTLY REMOVE CHLORINE FROM WASTEWATER, POTABLE WATER AND PROCESS WATER. EACH TABLET CONTAINS 92% SODIUM SULFITE.

Today's Answer for the Protection of Tomorrow's Environment



## comprehensive protection, guaranteed



The Hydro-Kinetic Wastewater Treatment System, Service Pro Control Center, and all Norweco components are warranted against defects in material and workmanship under normal use and service by our comprehensive 2 year Limited Warranty. A Warranty Registration Card and Owner's Manual are included with purchase. Warranty information is detailed on the back page of the Hydro-Kinetic System Owner's Manual.

### Other Products

#### **Singulair® Wastewater Treatment Plants**

FOR RESIDENTIAL APPLICATIONS

#### **Modulair® Wastewater Treatment Plants**

FOR SEMI-COMMERCIAL APPLICATIONS

#### **Travalair® Wastewater Treatment Plants**

FEATURING AUTO SLUDGE AND SKIMMER SYSTEM

***norweco***®

*Engineering the future of water  
and wastewater treatment*

**220 Republic Street  
Norwalk, Ohio, U.S.A. 44857-1156  
PH: 419.668.4471  
FAX: 419.663.5440  
www.norweco.com**

The Hydro-Kinetic System components are listed, licensed, and/or certified by each of the following agencies/organizations.



### Progress Through Service Since 1906

*We engineer, manufacture, install, and maintain advanced water and wastewater treatment technologies for residential properties, communities, and commercial properties that are not connected to sewer lines. Norweco treatment systems are in service all over the world.*

*Norweco®, Norweco.com®, Singulair®, Modulair®, Travalair®, Singulair Green®, Ribbit Rivet®, Hydro-Kinetic®, Lift-Rail®, Microsonic®, Bio-Dynamic®, Bio-Sanitizer®, Bio-Neutralizer®, Bio-Kinetic®, Bio-Static®, Bio-Gem®, Bio-Max®, Bio-Regeneration®, Bio-Perc®, Blue Crystal®, ClearCheck®, ChemCheck®, Tri-Max®, Hydra-Max®, Service Pro®, MCD®, TNT®, Grease Buster® and "BUSTER" logo are all registered trademarks of Norwalk Wastewater Equipment Company, Inc.*

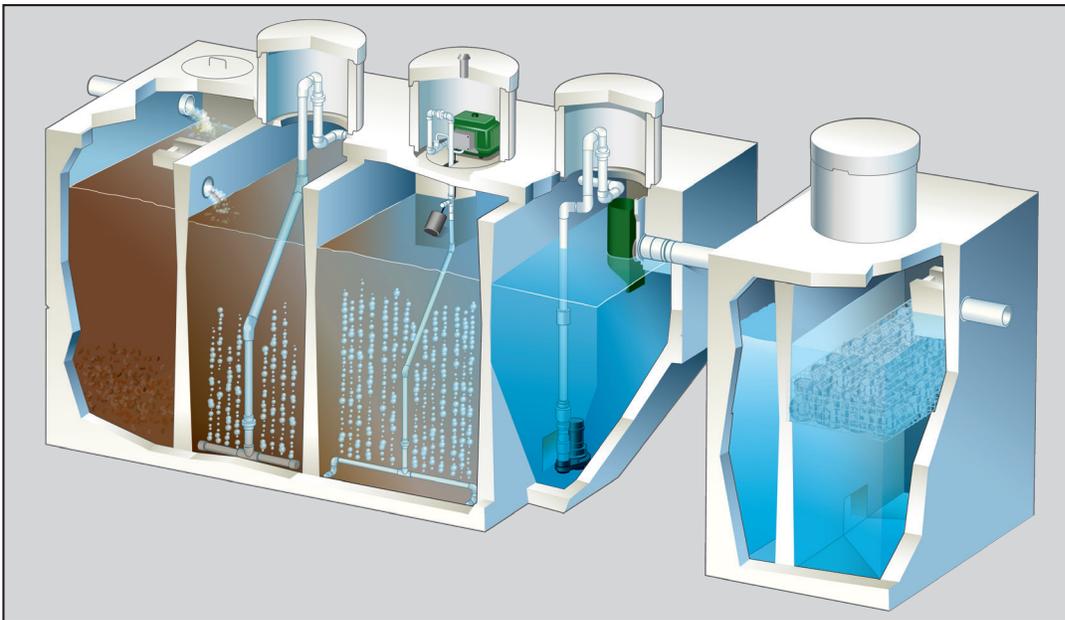
***norweco***<sup>®</sup>

**HYDRO-KINETIC**<sup>®</sup>

**WASTEWATER TREATMENT SYSTEM  
MODEL 600 FEU**

**GENERAL SPECIFICATIONS**

The contractor shall furnish and install one complete Hydro-Kinetic wastewater treatment system with all necessary parts and equipment as described in the following specifications. Treatment of the domestic wastewater shall be accomplished by the extended aeration process with non-mechanical flow equalization, pretreatment of the influent and filtration of the final effluent. The treatment system shall provide primary, secondary and tertiary treatment of the wastewater flow, denitrification, and if required, chlorination/dechlorination or ultraviolet disinfection of the effluent prior to discharge. All treatment processes shall be contained within reinforced precast concrete tankage meeting the requirements of ACI Standard 318. The wastewater treatment system shall be a Hydro-Kinetic Model 600 FEU as manufactured by Norweco, Inc., Norwalk, Ohio, USA.



The wastewater treatment system shall include precast concrete tankage providing separate pretreatment, anoxic, aeration, clarification and final filtration chambers. The tankage shall be furnished with cast-in-place inlets, submerged transfer ports, access risers with removable covers, cast-in-place molded plastic vent assembly, cast-in-place clarification outlet coupling and cast-in-place outlet tee. Principal items of electro-mechanical equipment supplied with the Hydro-Kinetic system shall be a Model A100 air pump, Model SD103 recirculation pump, UL Listed Service Pro Model 801P electrical control center with MCD technology, flow equalization device and Hydro-Kinetic FEU filter for final filtration of system effluent.

**SPECIFICATIONS**

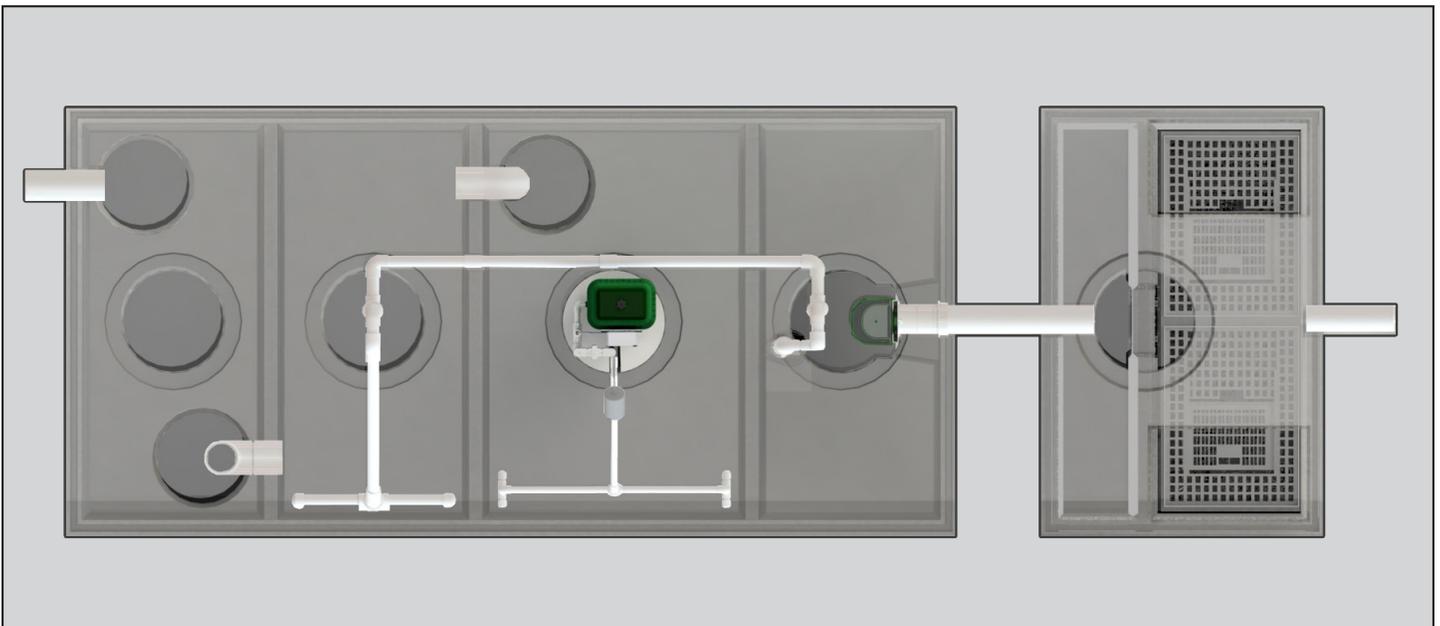
# HYDRO-KINETIC®

## OPERATING CONDITIONS

Total holding capacity of the system shall provide a minimum of 70 hour retention of the daily flow. The pretreatment chamber shall provide at least 15 hour retention, the anoxic chamber shall provide at least 15 hour retention, the extended aeration chamber shall provide at least 21 hour retention, the clarification chamber shall provide at least 7 hour retention and the Hydro-Kinetic filter shall provide at least 12 hour retention of the daily flow. The non-mechanical flow equalization device shall increase individual chamber and total system retention time in direct proportion to loading. Design of the system shall include a compartmented tank and non-mechanical flow equalization device to insure successful treatment performance without upset even when the significant runoff period is six hours. Hydraulic design considerations of the system and flow equalization device shall be such that intermittent peak flow factors as high as four shall not upset hydraulic reliability within the system. Capability of the system to perform as outlined, when built by an approved manufacturer, shall be certified by an independent testing laboratory and approved for use by the local governing regulatory agency.

## PRETREATMENT CHAMBER

All domestic wastewater shall be preconditioned while passing through the pretreatment chamber prior to being introduced to the anoxic chamber. The outlet of the pretreatment chamber shall be equipped with a discharge tee that extends vertically into the liquid so that only the preconditioned flow from the center area of the chamber is displaced to the anoxic chamber. The discharge tee and transfer port shall be of adequate size to handle a peak flow factor of four without restricting the outlet and disturbing hydraulic displacement to the anoxic chamber. A removable inspection cover shall be cast into the top of the pretreatment chamber to allow tank and transfer tee inspection. As a safety measure, the uncovered opening shall be small enough to insure that the tank cannot be entered for inspection or service.



## ANOXIC CHAMBER

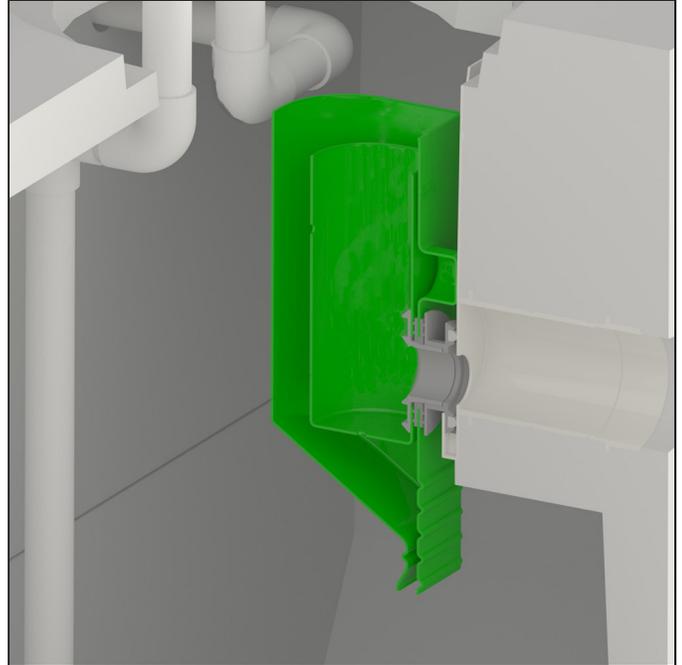
The anoxic chamber shall provide in excess of 15 hour retention of the equalized daily flow. In the anoxic chamber, low oxygen levels shall compel facultative heterotrophic bacteria to use nitrate-bound oxygen in their respiratory process. Nitrified liquid from the clarifier shall enter the chamber in measured doses and nitrogen compounds shall be converted to harmless nitrogen gas which shall escape into the atmosphere. Overall design of the chamber shall insure that effective mixing and suspension of the biomass is maintained in an anoxic condition to insure consistent biological denitrification. Systems that have not been performance certified to reduce Total Nitrogen (TN) to less than 10 mg/L shall not be considered for this application.

## AERATION CHAMBER

The extended aeration chamber shall provide in excess of 21 hour retention of the equalized daily flow. The chamber shall be of sufficient size to provide a minimum of 80 cubic feet of tank capacity per pound of applied BOD. The aeration chamber length-width-depth ratio shall be designed to insure uniform tank mixing and provide optimum treatment. The aeration chamber(s) shall be an integral part of the system flow path and constructed of properly reinforced 5,000 PSI, 28 day compression strength precast concrete. All castings used to construct the precast concrete tankage shall be monolithic units with external and internal walls incorporated into each section.

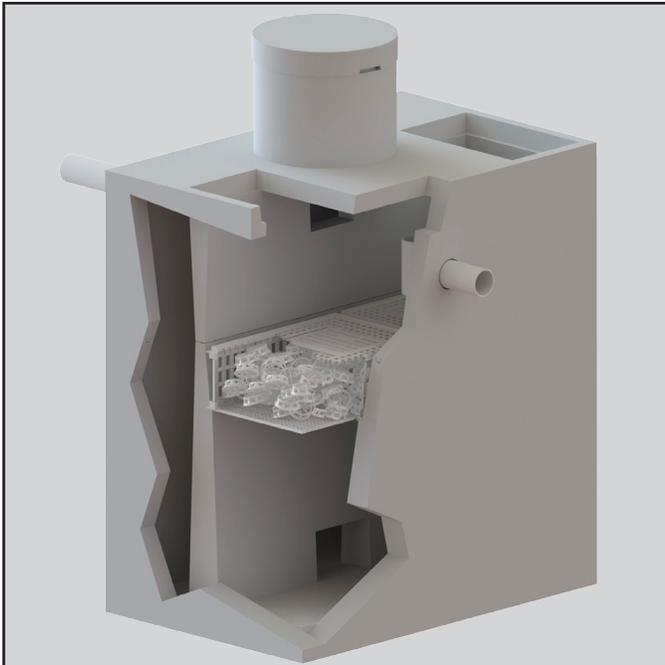
## FINAL CLARIFICATION CHAMBER

The final clarification chamber shall consist of 5 functionally independent zones operating together to provide satisfactory settling and clarification of the equalized flow. An inlet zone shall be provided and shall dissipate transfer turbulence at the flow inlet of the clarification chamber. A recirculation pump in the settled sludge zone shall transfer a portion of the wastewater back to the anoxic chamber. Liquid is then displaced into the hopper zone of the clarifier. In this zone, settling by gravity takes place. Three of the four sidewalls are slanted to form a hopper which directs all settled material back to the settled sludge zone. Clarified liquid from the hopper zone shall be displaced into the final settling zone to provide additional clarification of the liquid. The liquid is finally displaced to the outlet zone where the treated effluent shall pass through the flow equalization device and be discharged from the final clarification chamber.



## FLOW EQUALIZATION DEVICE

The system shall include a non-mechanical, demand use, flow equalization device. The device shall be installed with the design flow equalization port located below the normal liquid level of the clarifier. If intermittent flow rates exceed the capacity of the design flow port, flow shall be held upstream until the intermittent flow dissipates. If the intermittent flow continues to increase, the liquid level may reach a sustained flow equalization port. With both ports in use, flow through the system increases while continuing to provide flow equalization to upstream and downstream processes. A peak flow equalization port is supplied but should not be required in a properly sized system. The device shall control normal residential flow rates and reduce typical residential flow surges. The flow equalization rate shall be dependent upon the specific loading pattern and the duration of flow surges. At the 600 GPD (gallons per day) NSF Standard 40/245 design loading schedule, minimum performance of the device shall equalize daily flow an average of 50%.



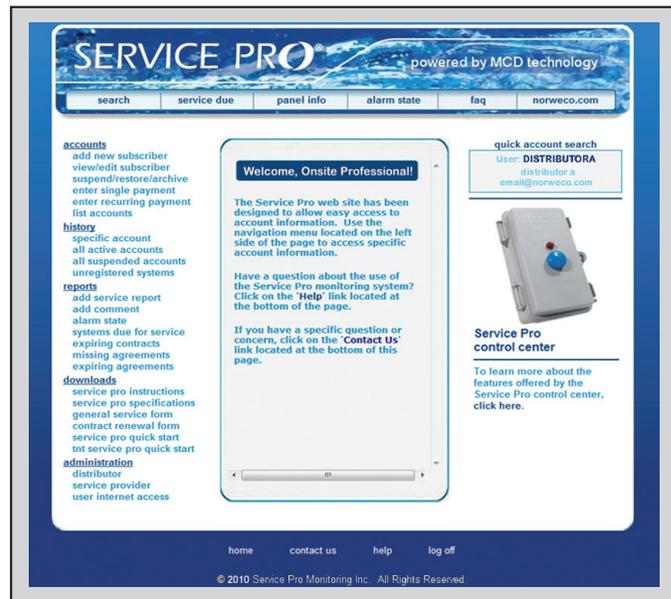
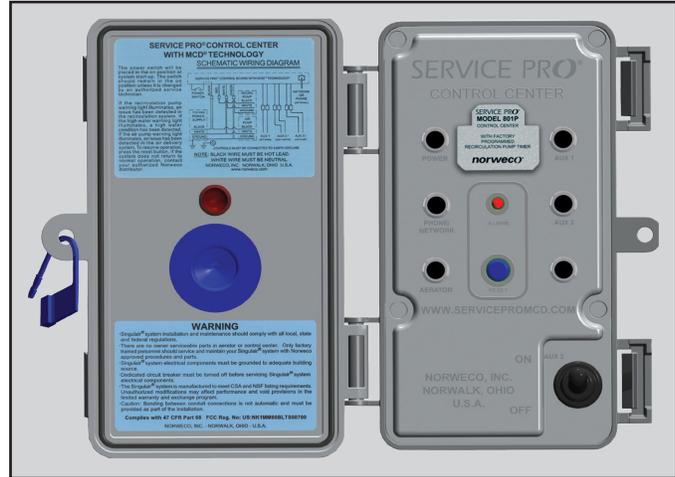
## HYDRO-KINETIC® FILTER

Significant reduction of organic matter shall occur in the treatment system prior to the Hydro-Kinetic filter. This Bio-Film reactor shall provide final treatment of the effluent to a near pristine state. Flow equalized liquid from the clarifier shall enter the influent chamber, travel down and be evenly distributed beneath the filtration media. The effects of gravity shall cause solids to settle to the bottom of the tank. As liquid travels up through the proprietary attached growth media, further reduction of organic matter shall take place. Additional settling and consolidation of solids shall take place downstream of the filter media. After passing through the filtration media for final polishing, the highly treated liquid shall flow into the final effluent zone before exiting the Hydro-Kinetic filter through the outlet tee.

# MODEL 600 FEU

## SERVICE PRO® MODEL 801P ELECTRICAL CONTROL CENTER

The Model 801P control center with MCD technology shall provide Monitoring, Compliance and Diagnostic functions for the treatment system. The pre-wired controls shall be mounted in a lockable NEMA rated enclosure designed specifically for outdoor use. The control center shall be a UL Listed assembly and shall include a time clock, alarm light, reset button, power switch, power light, phone/network light, recirculation pump light, air pump light, high water light and auxiliary alarm light. A pre-programmed time clock shall control the recirculation pump to insure that approximately 400% of the average daily flow is returned to the anoxic chamber. The control center shall monitor recirculation pump current, air pump operation, high water and auxiliary alarm circuitry. In the event of an alarm from the air pump or auxiliary input, the audible and visual alarms shall activate and the optional telemetry system shall report the condition. If abnormal operation of the recirculation pump is detected, a diagnostic sequence shall begin and the visual alarm shall activate. After a factory programmed recovery interval, an automatic restart attempt shall be initiated. If normal pump operation does not resume during 24 programmed recovery and restart cycles, the audible alarm shall activate and the optional telemetry system shall report the condition to the Service Pro monitoring center.



## SERVICE PRO® MONITORING CENTER

The Service Pro monitoring center shall include a 128 bit encrypted password protected website for interface with the monitoring center database. Access to the secure website shall be obtained through a unique user name and password that provides tiered access to data from monitored treatment systems. Access level tiers shall include distributors, service providers, regulatory agencies and individual system owners. Distributors and service providers shall be able to create accounts, enter serial numbers for system equipment, maintain service records and grant regulatory agencies access to the information. The monitoring center shall have the capability to schedule future service inspections and provide notification. Individual system owners shall be able to view information regarding their own systems, as well as download instructional information. Integrity of stored data shall be maintained through the use of multiple servers operating in geographically isolated locations.

## MODEL AT 1500 ULTRAVIOLET DISINFECTION SYSTEM (Optional)

The Hydro-Kinetic system shall be furnished complete with a Model AT 1500 ultraviolet disinfection system. The AT 1500 system shall incorporate a turbulence inducer and dual-pass design to insure pathogenic organisms receive maximum exposure to the ultraviolet light source. Effluent fecal coliform concentrations shall be consistently reduced to less than 200 mg/L. The ultraviolet disinfection system shall be UL Listed under Standard 979 as a residential treatment device and shall include a disinfection chamber, turbulence inducer, extension riser, quartz tube, Teflon cover, ultraviolet bulb and controls. An interlock switch shall be furnished to automatically disable the ultraviolet light source when the disinfection chamber is accessed. Ultraviolet disinfection systems without a residential UL Listing and an interlock switch have not demonstrated compliance with international electrical standards for safety and reliability and shall not be considered for this application.

# SPECIFICATIONS

## CERTIFIED PERFORMANCE

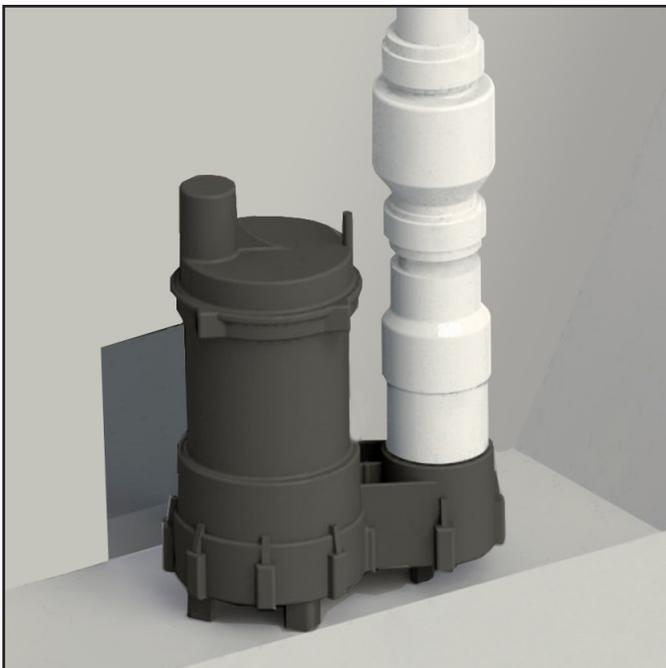
The wastewater treatment system shall be certified to operate for 12 consecutive months at the rated daily capacity without routine service. This performance shall be demonstrated by a continuous 12 month evaluation performed by an independent ANSI accredited, third-party testing facility. The evaluation shall consist of 2 consecutive ANSI/NSF Standard 40 and 245 evaluations back-to-back, including the stress sequences, with no maintenance allowed in between. When the first six-month evaluation is complete, the second full six-month evaluation shall immediately begin. For the entire certification protocol, the system shall achieve a total test average for the consecutive 12 month period of less than 5 mg/L Biochemical Oxygen Demand (CBOD), less than 5 mg/L Total Suspended Solids (TSS), and less than 10 mg/L Total Nitrogen (TN) in the effluent. Systems unable to meet these effluent quality parameters for at least 12 months of continuous testing by an independent ANSI accredited, third-party testing facility without service do not provide the desired level of effluent quality or service frequency, and shall not be considered for this application.



## MODEL A100 AIR PUMP

The Model A100 air pump shall be configured to allow remote mounting or installation within the access riser above the aeration chamber. When installed in the access riser, fresh air shall enter through a molded plastic vent assembly or integral perimeter vent in the access cover above the air pump. Fresh air shall enter the air pump through a filter located under the housing cover and be introduced below the liquid surface through a prefabricated diffuser assembly. Only the plastic diffuser assembly and the air piping shall be installed in contact with the liquid. The Model A100 air pump shall be wired for 115 volt, single phase, 60 cycle operation. The air pump shall include impact-resistant rubber diaphragms and valves which

prolong operational life. The unique design and construction shall provide easy maintenance, excellent cooling and quiet operation. The air pump shall continue aerating and mixing the aeration chamber even during high water conditions. Treatment systems that interrupt air delivery during high water conditions disrupt biological activity and shall not be considered for this application.



## MODEL SD103 RECIRCULATION PUMP

The Model SD103 submersible recirculation pump shall be wired for 115 volt, single phase, 60 cycle operation and shall be installed in the clarification chamber. The pump motor shall be  $\frac{1}{3}$  horsepower, operating at 3000 RPM. All openings in the flow path of the recirculation pump shall be of sufficient size to permit the passage of a  $\frac{3}{4}$ " diameter sphere. The pump shall be designed to be non-overloading throughout the entire pump curve and shall draw less than 7 full load amps. The pump motor shall contain moisture resistant windings and shall be securely mounted inside an oil-filled, watertight housing for maximum pump life. The stator housing and casing shall be of high grade cast iron or thermoplastic construction.

## **BLUE CRYSTAL® CHLORINATION SYSTEM (Optional)**

The Hydro-Kinetic system shall be furnished complete with a tablet feeder and a six month supply of Blue Crystal disinfecting tablets. Blue Crystal tablets shall be specifically formulated for consistent chlorine dosage and effluent disinfection to the sustained, variable and intermittent flows that are typical of domestic wastewater treatment systems. The tablets shall be manufactured from pure calcium hypochlorite and contain a minimum of 70% available chlorine. Each tablet shall be 2<sup>5</sup>/<sub>8</sub>" diameter, compressed to a 1" thickness, weigh approximately 5 ounces and be white in color with blue crystals for easy identification. The tablets shall dissolve in direct proportion to the flow rate, releasing controlled amounts of chlorine.

## **BIO-MAX® DECHLORINATION SYSTEM (Optional)**

The Hydro-Kinetic system shall be furnished complete with a tablet feeder and a six month supply of Bio-Max dechlorination tablets. The dechlorination tablets shall contain 92% sodium sulfite as the active ingredient and shall be specially formulated to chemically neutralize both free and combined chlorine. Each tablet shall be 2<sup>5</sup>/<sub>8</sub>" diameter, compressed to a 1<sup>3</sup>/<sub>16</sub>" thickness, weigh approximately 5 ounces and be green in color for easy identification. The tablets shall dissolve slowly, releasing controlled amounts of chemical for the instantaneous removal of residual chlorine from the system effluent.

## **LIMITED WARRANTY**

The wastewater treatment system shall be covered by a two year limited warranty. The Model A100 air pump, Model SD103 recirculation pump, Service Pro Model 801P control center and any other Hydro-Kinetic components purchased from the manufacturer shall be warranted to be free from defects in material and workmanship, under normal use and service, for a period of two years from the date of purchase. A warranty registration card shall be attached to the system before shipment from the factory. A means to register the wastewater treatment system for warranty protection via the internet shall be provided by the manufacturer for the convenience of the distributor, customer and regulatory agency. The distributor shall provide details of the limited warranty to the regulatory agency, contractor and customer as required.

## **EQUIPMENT MANUFACTURER**

The equipment specified herein shall be the product of a manufacturer having a minimum of seven years experience in the construction of prefabricated wastewater treatment equipment and systems. Bids shall be prepared on the basis of the equipment and material specified herein for purposes of determining the low bid. This is not done, however, to eliminate other products or equipment of equal quality and efficiency. If equipment is to be substituted, approval of such substitution must be made prior to execution of any order. It is assumed that substitution will result in a reduction of cost to the contractor and that if accepted, these savings will be passed along by a reduction in the base bid.

**PROGRESS THROUGH SERVICE SINCE 1906**

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## **HYDRO-KINETIC<sup>®</sup>**

### WASTEWATER TREATMENT SYSTEM WITH SERVICE PRO<sup>®</sup> CONTROL CENTER

# MODELS 600 AND 600 FEU OWNER'S MANUAL

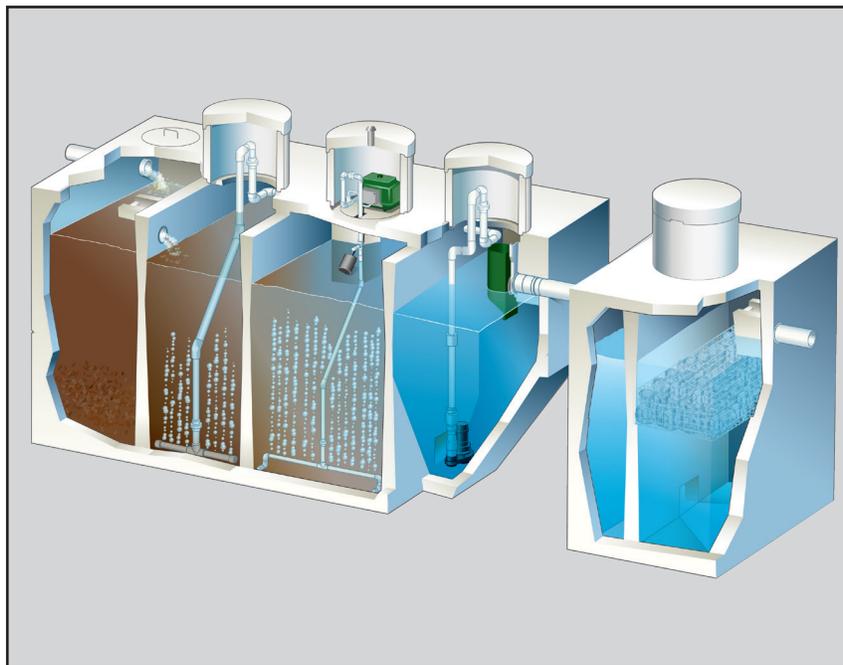
## INTRODUCTION

The Hydro-Kinetic system is the finest wastewater treatment technology available. It is a sound investment that protects you and the environment. Please take the time to familiarize yourself with the contents of this manual.

## HOW THE SYSTEM WORKS

Developed to serve homes and small businesses outside of city sewers, the Hydro-Kinetic system uses the extended aeration process to treat wastewater and features innovative nitrification-denitrification technology.

Wastewater enters the pretreatment chamber where gravity combines with anaerobic bacterial action to precondition the waste before it flows into the anoxic chamber. Once in the anoxic chamber, facultative anaerobes digest organic matter. Flow then enters the aeration chamber where aerobic bacteria biologically convert the waste into stable substances and oxidize ammonia into nitrite and nitrate. Following aeration, liquids flow to the clarification chamber where gravity settles out biologically active material. A recirculation pump in the clarifier transfers a portion of the wastewater back to the anoxic chamber where nitrogen compounds are converted to harmless nitrogen gas which escapes into the atmosphere. From the clarifier, treated liquids pass through the flow equalization device and into the disposal system. In the Model 600 FEU, effluent passes through the Hydro-Kinetic filter, treating the liquid to a near pristine state. As a result, complete pretreatment, aeration, clarification, denitrification and effluent polishing are assured. The Hydro-Kinetic system reliably protects you, your property and the environment.



## FEATURES AND ADVANTAGES

All Hydro-Kinetic tanks are constructed of reinforced precast concrete or high-density polyethylene (HDPE). Internal walls and baffles are cast-in-place or integrally molded to insure uniformity and strength. Risers and covers are either precast concrete, HDPE or heavy duty, glass-filled polypropylene. All components that will contact the wastewater are constructed entirely of molded plastic, stainless steel, cast iron or rubber.

The Model A100 air pump has been designed specifically for the Hydro-Kinetic system. Delivering a continuous supply of air to insure proper mixing and oxidation of the organic material, this 100 watt air pump uses 50% to 78% less energy than most major appliances. The recirculation pump operates on a preset run cycle to assure proper system operation.

The treatment system is supplied with a prewired electrical control center contained in a NEMA rated enclosure. The control center contains a power switch and factory programmed logic to monitor and control air pump and recirculation pump operation. The

local distributor's name, address and telephone number are displayed on the control center cover. All system controls and necessary owner information are conveniently located at your fingertips.

Non-mechanical flow equalization is provided in the clarifier by the patented flow equalization device. Effluent polishing, ultraviolet disinfection and chemical treatment are available options. All Hydro-Kinetic components work together to assure complete pretreatment, aeration, clarification, denitrification and effluent polishing.

## SYSTEM PERFORMANCE

The Hydro-Kinetic Model 600 FEU treatment system is the first and only wastewater treatment technology to complete two consecutive NSF/ANSI Standard 40 and 245 certifications without routine service. The Model 600 without the Hydro-Kinetic filter is rated Class I, averaging effluent of 4.0 mg/L CBOD and 7.0 mg/L TSS the first 6 month evaluation. The second 6 month averages are 4.0 mg/L CBOD and 7.0 mg/L for an overall 12 month test average of 4.0 mg/L CBOD and 7.0 mg/L TSS.

In ecologically sensitive areas, the most stringent effluent standards are 10 mg/L CBOD, 10 mg/L TSS and 10 mg/L TN. The Model 600 FEU system with Hydro-Kinetic filter is also rated Class I, averaging of 2.0 mg/L CBOD, 2.0 mg/L TSS and 8.7 mg/L TN for the first 6 month evaluation. The second 6 month averages are 1.8 mg/L CBOD, 1.6 mg/L TSS and 7.05 mg/L TN, for an overall 12 month test average of 2.0 mg/L CBOD, 2.0 mg/L TSS and 7.9 mg/L TN.

## OPERATIONAL REQUIREMENTS

The Hydro-Kinetic system is designed to treat only domestic wastewater. Domestic wastewater is defined as the waste generated from a typical residence. This includes flows originating from: bathtubs, clothes washers, dishwashers, drinking fountains, water coolers, food grinders, kitchen sinks, lavatories, mop basins, service sinks, shower stalls, sinks, wash sinks, water closets and whirlpool baths. While the use of bio-degradable detergents is recommended, the Hydro-Kinetic system has been designed to handle any reasonable amount of bathroom, kitchen or laundry waste. However, some care should be exercised to insure that non-biodegradable and/or toxic materials are not disposed of via the domestic wastewater plumbing. Do not use the plumbing system for disposal of lint, cooking grease, scouring pads, diapers, sanitary napkins, cotton balls, cotton swabs, cleaning rags, dental floss, strings, cigarette filters, rubber or plastic products, paints and thinning agents, gasoline, motor oil, drain cleaners or other harsh chemicals. These items could plug portions of the plumbing and/or adversely affect system performance. Never connect roofing down spouts, footer drains, sump pump piping, garage and basement floor drains or water softener backwash to the domestic wastewater plumbing or the treatment system. Water softener backwash will interfere with biological treatment and must be disposed of separately.

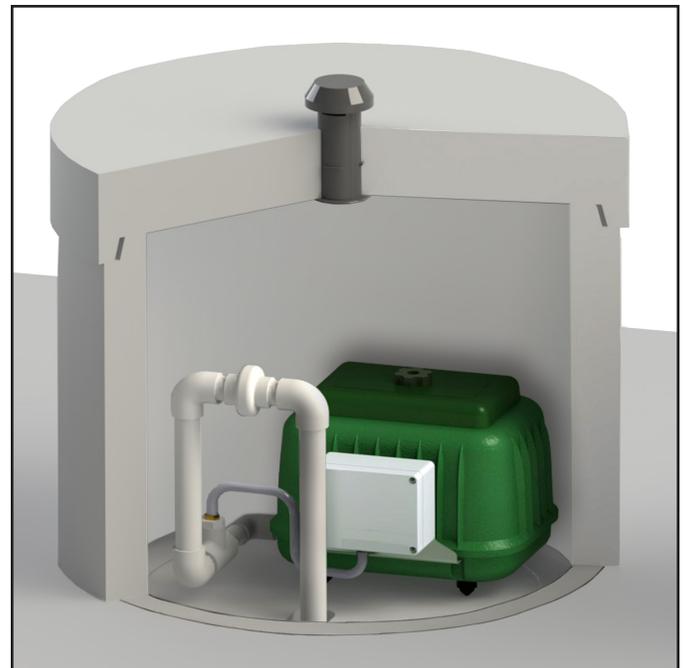
## ELECTRICAL REQUIREMENTS

Each Hydro-Kinetic system must be wired to a dedicated 115 volt, single phase circuit at the main electrical service panel. A 15 amp circuit is recommended (10 amp minimum). A pictorial wiring diagram is provided inside the control center enclosure. All electrical work must be performed in accordance with the requirements of the National Electrical Code and all applicable local codes. Electrical connections should be made only by a qualified electrician following proper procedures and using safe tools.

**CAUTION:** Any time service is required, first shut off the dedicated circuit breaker in the main electrical service panel. Next, shut off the power switch in the Service Pro control center. Failure to do so could result in personal injury or equipment damage.

## MODEL A100 AIR PUMP

The Model A100 air pump has been specifically designed for use in the Hydro-Kinetic treatment system and includes impact-resistant rubber diaphragms and valves to prolong air pump life. The unique design provides excellent cooling and quiet operation. The Model A100 air pump can be remotely mounted or installed in the access riser above the aeration chamber. Fresh air enters the air pump through a filter located under the cover of the pump housing. The air is introduced below the liquid surface through a prefabricated diffuser assembly. Only the plastic diffuser assembly and the air piping are submerged. Each Model



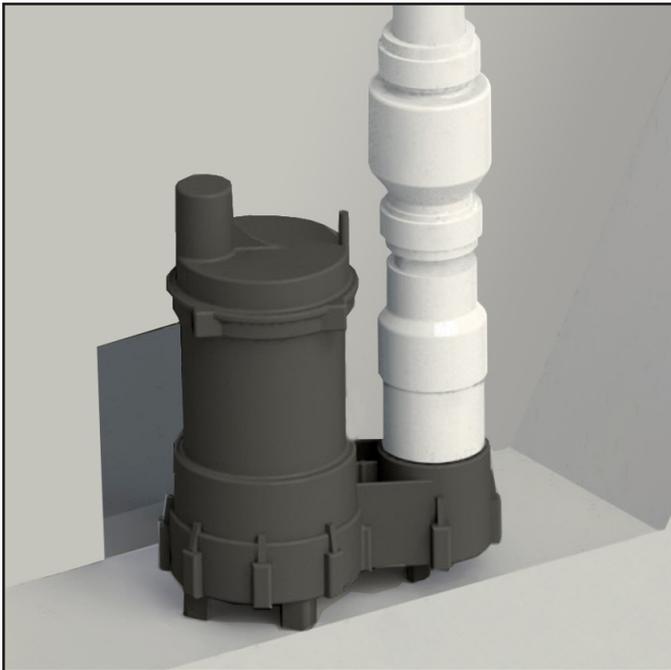
A100 air pump is a precision engineered electro-mechanical device. Do not remove it from its installed position. Do not attempt any type of repair. Contact your local Hydro-Kinetic distributor if service is needed. Unauthorized tampering or repair of the air pump will void important provisions of the two year limited warranty.

## FRESH AIR VENTING SYSTEM

A fresh air vent assembly is cast into the concrete access cover above each air pump, or designed into the perimeter of the polypropylene lid. The perimeter vent or assembly supplies fresh air to the air pump, which is delivered through the diffuser assembly and into the wastewater. Finished landscaping should be maintained six inches below the top of the vented access cover and graded to drain runoff away from the cover. Do not allow plants, shrubbery, mulch or landscaping of any type to restrict the flow of air to the vent assembly or obstruct the access cover.

## MODEL SD103 RECIRCULATION PUMP

The Model SD103 recirculation pump includes a durable electric motor and corrosion resistant pump housing. The pump features a 2" discharge connection and is capable of handling up to ¾" solids. Permanently lubricated ball bearings insure quiet operation and long life. The recirculation pump is installed in the bottom of the clarification chamber and delivers liquid to the anoxic chamber through a prefabricated mixing bar assembly. Each Model SD103 pump is a precision engineered electro-mechanical device. Do not remove it from its installed position. Do not attempt any type of repair. Contact your Hydro-Kinetic distributor if service is needed. Unauthorized tampering or repair of the recirculation pump will void important provisions of the two year limited warranty.



## SERVICE PRO® MODEL 801P CONTROL CENTER

The system includes a prewired Service Pro Model 801P control center with MCD technology to permit fully automatic operation. The control center is UL listed and provides MONITORING, COMPLIANCE and DIAGNOSTIC functions complete with telemetry, cellular transmission or network connection to communicate with the Service Pro remote monitoring center. If recirculation pump operation has been interrupted, the Model 801P control center will activate the visual alarm and attempt to restart the pump every five minutes for two hours. If the pump does not restart after two hours, the audible alarm will sound. If an air pump, high water or auxiliary alarm condition occurs, both visual and audible alarms will activate. When the system is covered by a Service Pro monitoring agreement, the distributor will be automatically notified and the alarm condition will be displayed on the monitoring center website, [www.servicepromcd.com](http://www.servicepromcd.com). Each control center is factory preset to run the recirculation pump at the proper interval. This programmed time cycle insures that the correct dose is delivered to the anoxic chamber for denitrification.

## SERVICE PRO® MONITORING CENTER

When connected to a telephone line, cellular transmission device or network cable, the control center will automatically notify the Service Pro monitoring center of any service required to the treatment system or accessory components.



The monitoring center automatically records the time and date of any alarm condition, as well as service performed, and posts this information to your system's history record accessible at [www.servicepromcd.com](http://www.servicepromcd.com). All information regarding your system is available to you on the secure, password protected Service Pro website. Contact your Hydro-Kinetic distributor for your user name and password.

**NOTE:** If using a telephone line, the control center regularly communicates with the monitoring center via a toll free number. If the control center is using the line when you attempt to place a call, a high pitched digital communication signal will be heard. Hang up all telephones sharing the line and wait a few seconds. This will automatically disconnect the control center and make the line available for use.

## NON-MECHANICAL FLOW EQUALIZATION

The Hydro-Kinetic system provides non-mechanical flow equalization for the treatment process. Equalization reduces hydraulic surges (e.g. typical shower of 10 minutes duration, bathtub discharge of 5 minutes duration, clothes washer discharge of 2 minutes duration and dishwasher discharge of 2 minutes duration) throughout the system. The flow equalization causes wastewater to be held upstream of the final outlet during hydraulic surges, which preserves treatment integrity and enhances system operation. The actual rate of equalization varies and depends upon specific loading patterns and the duration of each flow surge. At the Standard 40/245 design loading pattern, the system equalizes all flow an average of 50%. As a result, hydraulic surges and periods of high flow are automatically reduced on a demand use, as needed, basis.

## HYDRO-KINETIC® FILTER

A Hydro-Kinetic filter is included with the Model 600 FEU system. Proven in a 12 month NSF/ANSI Standard 40/245 evaluation, this innovative, non-mechanical device reduces CBOD and TSS by up to 75%. Flow equalized liquid from the clarifier enters the influent chamber, travels down and is evenly distributed beneath the filtration media. As liquid travels up through the proprietary attached growth media, further reduction of the organic matter takes place. After passing through the bio-film reactor for final polishing, the highly treated liquid flows into the final effluent zone before exiting the Hydro-Kinetic filter and being safely returned to the environment.

## AT 1500 ULTRAVIOLET DISINFECTION SYSTEM

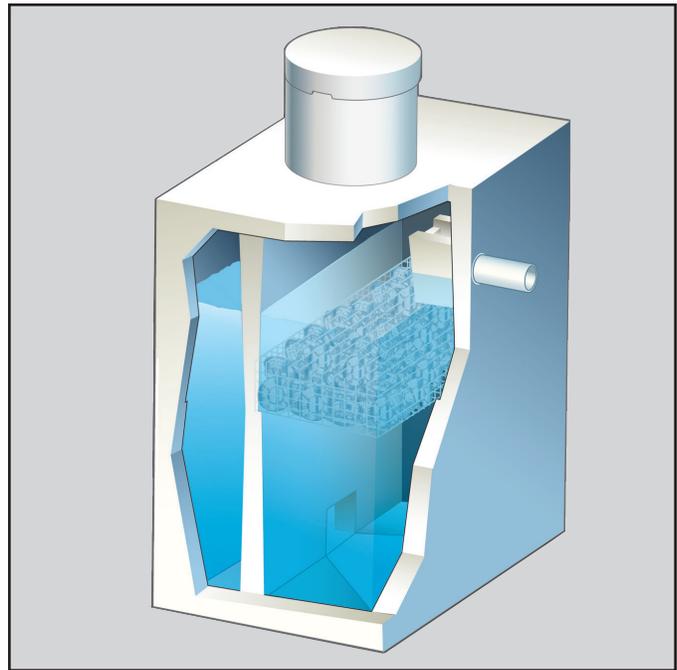
If local regulations require, the AT 1500 ultraviolet (UV) disinfection system can be installed to meet strict water quality standards. The Model AT 1500 is the only UV treatment system listed by Underwriters Laboratories to Standard UL 979 for residential applications. All electrical components are contained in a NEMA 4X weatherproof enclosure which incorporates a built-in safety interlock switch to disable power and prevent UV exposure. The dual-pass contact chamber design insures treatment integrity, rendering pathogens completely harmless by the reliable performance of the AT 1500 system.

**CAUTION: Ultraviolet rays can cause permanent eye and skin damage. UV blocking safety glasses and protective clothing must be worn during installation, service or any time the bulb may be illuminated. Do not modify or bypass the safety interlock switch. Disconnect power prior to service.**

## BLUE CRYSTAL® DISINFECTING TABLETS

If local regulations require, Blue Crystal disinfecting tablets can be used with a Bio-Dynamic tablet feeder for effluent chlorination. Specifically formulated for use in residential treatment systems, Blue Crystal disinfecting tablets provide efficient and reliable disinfection. Manufactured from calcium hypochlorite, Blue Crystal disinfecting tablets provide effective, economical bacteria killing power. A fully charged feed tube will last an average of three to six months. During each service inspection, the technician will check system operation, the rate of tablet consumption and install tablets to insure maximum system performance.

**CAUTION: The improper handling of Blue Crystal tablets may cause personal injury or property damage. Keep out of the reach of children and do not allow tablets or feed tubes to contact skin, eyes or clothing. Tablets may be fatal if swallowed and tablet dust is irritating to the eyes, nose and throat. Do not handle the tablets or feed tubes without first carefully reading the container label, MSDS information and the handling and storage instructions. Mixing chemicals may cause a violent reaction leading to fire or explosion.**



## BIO-MAX® DECHLORINATION TABLETS

Bio-Max tablets are formulated to remove chlorine residual to non-detectable levels for the protection of sensitive receiving environments. Containing 92% sodium sulfite as the active ingredient, the tablets neutralize both free and combined chlorine. A fully charged feed tube will last an average of three to six months. During each service inspection, the technician will check system operation, the rate of tablet consumption and install tablets to insure maximum system performance.

**CAUTION: Bio-Max tablets should not be mixed with Blue Crystal tablets. Do not handle tablets or feed tubes without first reading the container label, MSDS information and the handling and storage instructions.**

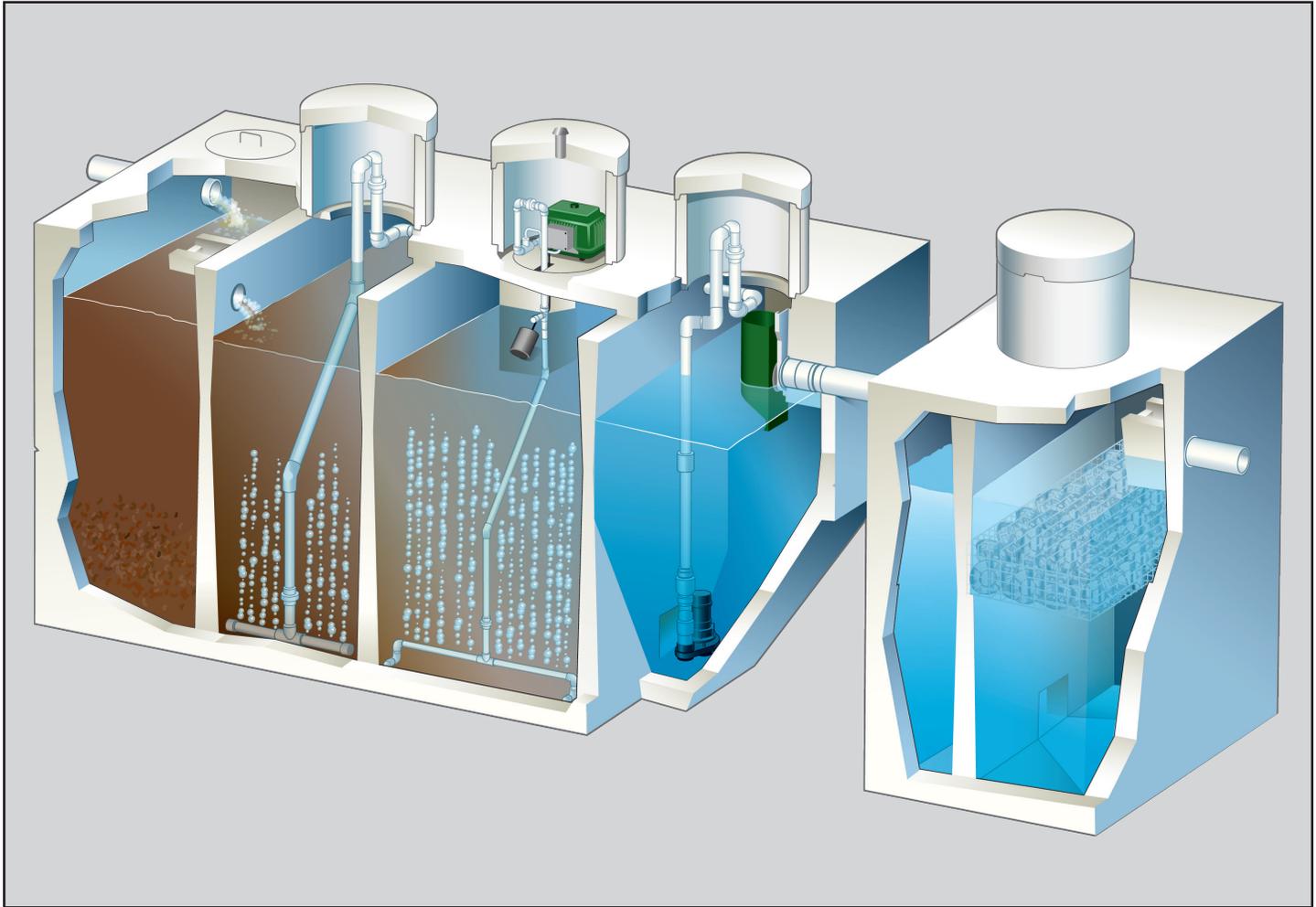
## NO OWNER MAINTENANCE

The Hydro-Kinetic system should be inspected and serviced by a qualified service provider, therefore, no owner maintenance is required during the warranty period. How often pumping is necessary depends on system use. The local distributor will inspect the system during the warranty period to determine if pumping is required. Pumping will normally be required at three to five year intervals. Contact your local distributor prior to pumping for complete instructions. A properly licensed tank pumping service must be used for removal and disposal of tank contents. The tank pumper should consult with local authorities to determine the proper disposal method. **NOTE: Make sure the system is refilled to capacity with clean water after pumping.**

If a period of intermittent use or an extended period of non-use of the system is anticipated, contact your service provider for instructions. Your service provider has comprehensive system service instructions and troubleshooting procedures.

## HYDRO-KINETIC® SERVICE PROGRAM

Service inspections, performed every 12 months (or as required by your local governing regulations) for the first two years of system operation, are provided by your local Norweco distributor and are included in the original purchase price of the Hydro-Kinetic system. Costs for travel and labor are not charged to the owner. During an inspection, the Model A100 air pump, Model SD103 recirculation pump and other plant components are serviced as outlined in the Hydro-Kinetic Service Instructions. After the initial two year service program is completed, the local service provider will offer continued service at the owner's option. In many areas, this continuing service agreement is required by the local regulatory agency. The service program should be renewed by the owner to insure maximum system performance.



Ask your Hydro-Kinetic service provider about a renewable service contract. If you allow service coverage to expire, you can still obtain the professional assistance of a local service provider. However, these special service calls will be performed on a time and materials basis. Professional service is important to proper system operation and should not be allowed to lapse. Be sure to consider the advantages of a renewable service contract.

The Hydro-Kinetic service provider will perform the following services during each service inspection:

- ✓ Inspect pretreatment chamber
- ✓ Check air pump operation
- ✓ Check air pump power consumption
- ✓ Check air pump diaphragms
- ✓ Check air pump intake filter
- ✓ Check diffuser
- ✓ Clean fresh air vent in aeration cover
- ✓ Check recirculation pump operation
- ✓ Check recirculation pump power consumption
- ✓ Check mixing bar
- ✓ Check operation of control center
- ✓ Scrape the clarification chamber
- ✓ Clean flow equalization device
- ✓ Inspect effluent quality
- ✓ Inspect all transfer ports
- ✓ Inspect outlet line
- ✓ Inspect optional Hydro-Kinetic filter
- ✓ Check optional disinfection system
- ✓ Inspect ground water relief point
- ✓ Inspect effluent disposal system
- ✓ Complete 3-part service record
- ✓ Hang owner's record on front door
- ✓ Enter record into [www.servicepromcd.com](http://www.servicepromcd.com)
- ✓ Mail health department notification

## WARRANTY REGISTRATION

A Warranty Registration Card for the Hydro-Kinetic system was attached to the Model A100 air pump before it was shipped from the factory. If this card has not been returned to Norweco, complete and mail it immediately. If it is not returned within thirty days of the installation date, the two year limited warranty will begin on the date of component shipment from the factory.

Remove the Hydro-Kinetic system record card and store it in a safe location with this Owner's Manual for future reference. If it is necessary to call your service provider for service, make note of the information on the control center data plate and the air pump serial number before calling. Warranty and service records are cross-indexed by owner name, air pump serial number or control center serial number. Supplying the air pump serial number and control center serial number with the service request will give the service provider a ready reference so that changes in system ownership will not delay service.

## TWO YEAR LIMITED WARRANTY

The Hydro-Kinetic system components are backed by a two year limited warranty. Each Model A100 air pump, Model SD103 submersible recirculation pump, Service Pro Model 801P control center and any other components manufactured by Norweco, are warranted to be free from defects in material and workmanship, under normal use and service, for a period of two years from the date of purchase. The two year limited warranty is included in the original purchase price of every Hydro-Kinetic system. If the air pump, recirculation pump or Service Pro control center fails, do not use or dismantle the unit. Do not remove it from its installed position. Do not attempt any type of repair. Unauthorized tampering or repair will void important provisions of the limited warranty. The local, licensed Hydro-Kinetic dealer or service center has detailed warranty information and should be contacted for service or replacement instructions.

## SERVICE PRO® SECURITY LOG IN

For your convenience, record your [www.servicepromcd.com](http://www.servicepromcd.com) access information here:

<b>User name:</b>	<b>Password:</b>
-------------------	------------------

## SUPPLEMENTAL SERVICE RECORD

For your reference, please document service performed on the following chart:

DATE	DESCRIPTION

***norweco***®

*Engineering the future of water  
and wastewater treatment*

220 REPUBLIC STREET  
NORWALK, OHIO, USA 44857-1156  
TELEPHONE (419) 668-4471  
FAX (419) 663-5440  
[www.norweco.com](http://www.norweco.com)

**DISTRIBUTED LOCALLY BY:**

Norweco®, Norweco.com®, Singulair®, Modulair®, Travalair®, Singulair Green®, Ribbit River®, Hydro-Kinetic®, Lift-Rail®, Microsonic®, Bio-Dynamic®, Bio-Sanitizer®, Bio-Neutralizer®, Bio-Kinetic®, Bio-Static®, Bio-Gem®, Bio-Regeneration®, Bio-Perc®, Bio-Max®, Blue Crystal®, ClearCheck®, ChemCheck®, Tri-Max®, Hydra-Max®, Service Pro®, MCD®, TNT®, Grease Buster® and "BUSTER" logo® are registered trademarks of Norwalk Wastewater Equipment Company, Inc.

# HYDRO-KINETIC®

## TWO YEAR LIMITED WARRANTY

Norweco, Inc. warrants every new air pump, recirculation pump, control center, Bio-Film reactor and any other Hydro-Kinetic component manufactured by Norweco to be free from defects in material and workmanship under normal use and service for a period of two years from the date of installation, as provided herein. Norweco will repair or replace the warranted component which in the sole judgement of Norweco shows evidence of manufacturing defect, provided that the defective component is returned to the factory, freight prepaid, by a licensed Hydro-Kinetic distributor, licensed service center or authorized dealer. This limited warranty shall be recognized in effect for two years from the date of Hydro-Kinetic system installation, if a warranty registration card has been properly registered with the factory, according to the terms of this warranty. If the warranty registration card has not been registered upon installation of the Hydro-Kinetic system, the limited warranty shall be recognized in effect for two years from the date the warranted component was shipped from the factory.

Norweco reserves the right to revise, change or modify the construction or design of the Hydro-Kinetic system or component parts without incurring any obligation to make such changes or modifications in earlier model components. Norweco reserves the right to furnish new or rebuilt component parts which, in Norweco's judgement, are the equivalent of the parts being replaced.

Service may occasionally be required for the Hydro-Kinetic system due to damage resulting from accident, improper use, voltage fluctuations greater than  $\pm 5\%$  of the component nameplate rating, abuse, tampering, act of God, improper installation, vandalism or failure to follow operating procedures. As this damage has not resulted from defects in workmanship or material, it shall not be covered by this warranty. Service charges incurred in these cases, including parts and labor, shall not be assumed by Norweco and shall be the responsibility of the customer.

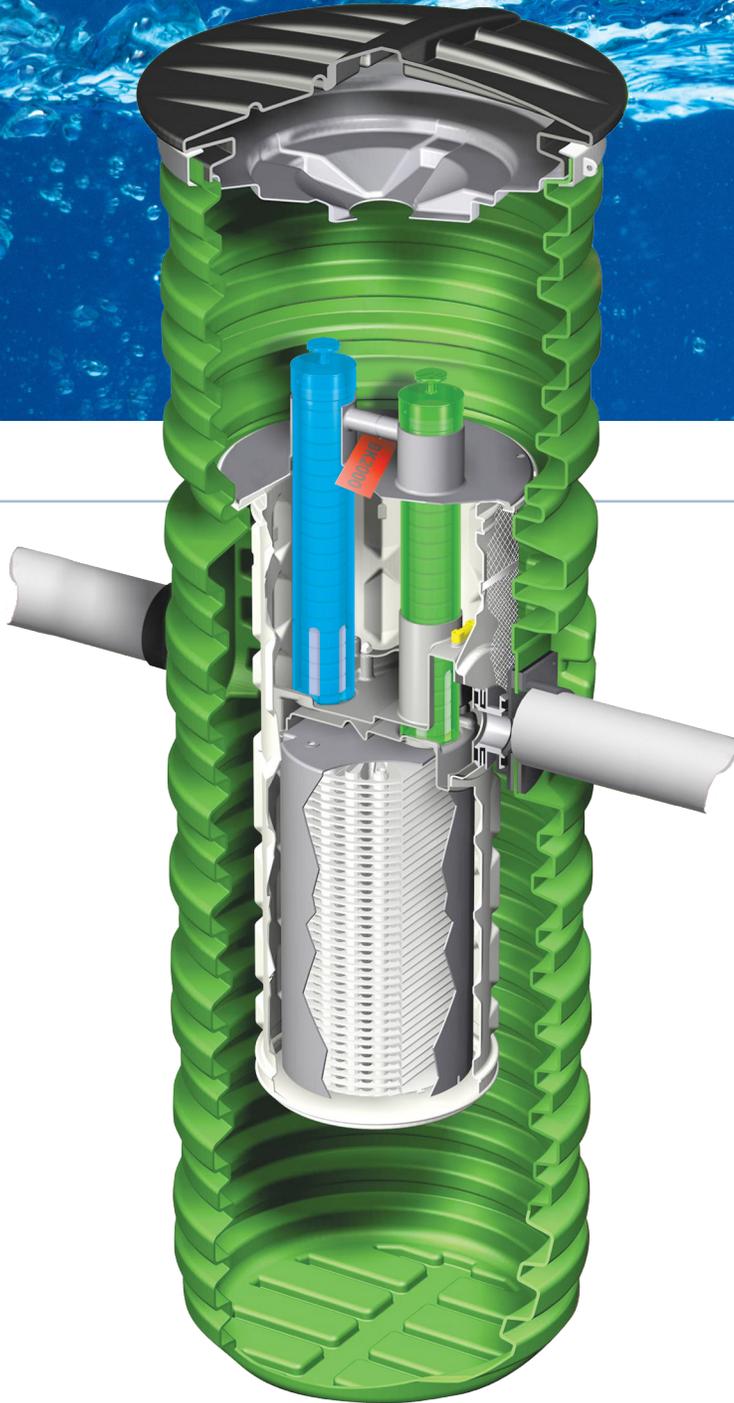
This Hydro-Kinetic two year limited warranty does not include any portion of the customer's wiring, plumbing, drainage, disposal system, or tankage not manufactured by Norweco, nor does it include freight charges (round trip) required to return the warranted component for factory replacement. Norweco shall not be responsible for damages of any kind or character resulting from or caused directly or indirectly by any defective component, inaccuracy, weakness, failure or delay. The warranty shall not apply to any missing components or to any items which have been disassembled, repaired, altered or tampered with, prior to their return to the factory. Therefore, if a Hydro-Kinetic component part fails to meet Norweco's manufacturing standards or product representations stated herein, do not use or dismantle it, contact the local licensed Hydro-Kinetic distributor, licensed service center or authorized dealer. The distributor, service center or dealer will arrange to have the component part returned to Norweco. Norweco's liability is limited solely to the replacement of the defective component part. Norweco shall not be liable for any labor involved during the removal or replacement of equipment, nor for charges for equipment, freight, transportation, inspection or handling of any component part. In no case will Norweco be liable for loss incurred because of interruption of service or for consequential damages, contingent liabilities or other similar expenses.

This limited warranty is, and the owner agrees that it shall be, in lieu of all other warranties whether expressed or implied. No distributor, service center, dealer or person is authorized or permitted to make any contract or assume any other obligations or liabilities for Norweco. Laws governing limited warranties vary in some states and although this warranty gives the owner specific legal rights there may be additional rights not contained herein.

***norweco***®

220 Republic Street  
Norwalk, OH, U.S.A. 44857-1156  
Telephone (419) 668-4471  
Fax (419) 663-5440

# BK 2000



***norweco***<sup>®</sup>

*Engineering the future of water  
and wastewater treatment*



# BK 2000

the BIO-KINETIC® Wastewater Management System **protects**

property that's outside **municipal** sewer lines

Just because you live in an area that isn't served by municipal sewer lines, you don't have to endure all the problems that come with septic tanks. Bad odors, pollution, costly maintenance and failures are easily eliminated with the BK 2000, the wastewater management system that protects everything that is most important to you – your home, family and environment.

Wastewater management is a critical part of suburban and rural real estate development. Failures cause problems that are expensive to repair and damage that is hard to clean up. With so much at stake, it is vitally important to make the right water and wastewater treatment decision. We've been providing progress through service since 1906. When you consider the facts presented in this brochure, you'll see why Norweco is recognized as today's answer for the protection of tomorrow's environment.

**solutions** in wastewater treatment

# How the BK 2000 System manages the treatment process

## Heavy-Duty Access Cover

The cover, which is available in black or green to blend into your landscape, securely interlocks with the top rib of the Settling and Retention Basin. A locktab is provided to secure the cover and clamp. Unlike conventional treatment systems that are hard to access, the BK 2000 is easily maintained from grade. Routine annual inspections do not require tank pumping trucks, backhoes or confined space entry equipment. You can schedule inspections through a simple service contract with your local Norweco dealer or distributor, or with their authorized agent.

## Baffled Perimeter Zone

The second of our 9 settling zones, the Baffled Perimeter Zone, is positioned immediately downstream from the Molded Filter Media to capture any contaminants that may have cleared the filter media.

## Flow Deck

The Flow Deck with an adjustable outlet weir is just downstream of the six flow ports. Liquids entering and exiting the BK 2000 are held, controlled and directed by this Flow Deck.

## Settling and Retention Basin

Constructed of corrosion-resistant polyethylene, the core basin is built to treat wastewater for a lifetime. Need more storage capacity? Simply add risers and more ring sections.

## Safety/Service Guard

Located beneath the Access Cover, it prevents any accidental entry into the Basin and functions as a service funnel for routine maintenance.

## Removable Moisture/Vapor Shield

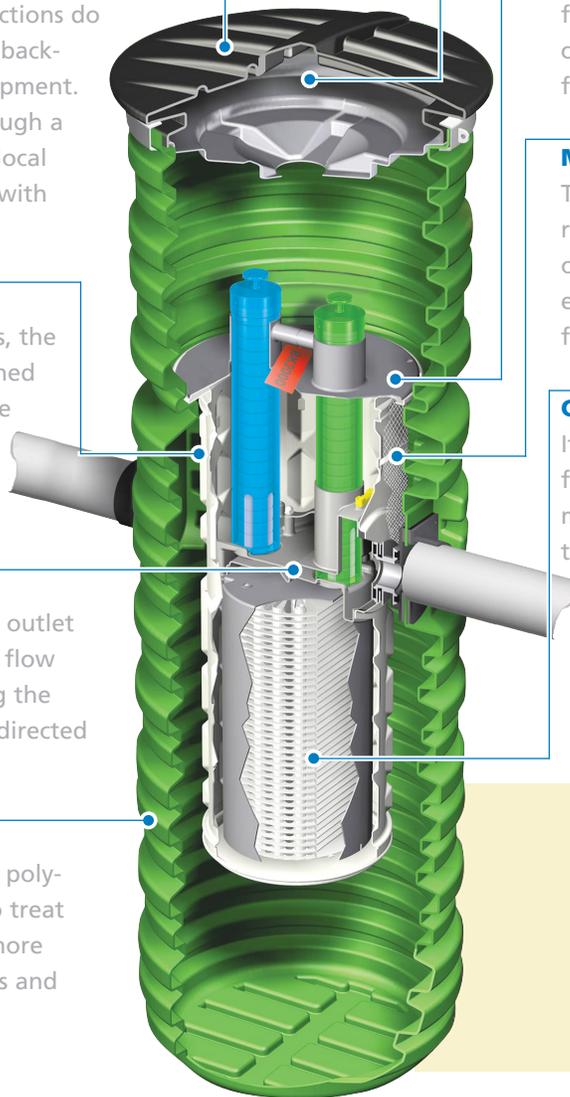
This shield prevents condensation from entering the system. Built-in collars secure our optional chemical feed tubes.

## Molded Filter Media

The Molded Filter Media traps and retains suspended solids that would otherwise plug your filter bed. These easy-to-clean filters function reliably for the life of the system.

## Compartmented Settling Zone

It contains 42 chamber plates and 329 feet of kinetic filtration to establish a multidirectional plug flow path through the system.



## Hubs

HUBS ON OUR QUICK-DISCONNECT WITH ANTI-SHEAR INLET AND OUTLET PROVIDE A 4" SOCKET FOR SCHEDULE 40 PVC PIPE. A WATERTIGHT CONNECTION AND SIMPLE INSTALLATION AND REMOVAL ARE ASSURED BY A QUICK-DISCONNECT COUPLING.



## customer focus

Your BK 2000 System is installed and maintained by your local, Norweco-trained Distributor. Every member of our team is fully trained and always at your service for worry-free support and protection.

### Here are the pure facts:

- By equalizing flows up to 2,000 gallons per day, the BK 2000 reduces hydraulic and solids loading rates by more than 50%.
- The BK 2000 automatically doubles your system's performance and its operational life by eliminating solids washout and hydraulic overloads.
- It permits any conventional treatment method to fully utilize upstream tank capacity to store and treat accumulated wastewater. Even if you have to put up with marginal soils, high water tables, bed-rock, heavy rains, hydraulic or organic overloads, the BK 2000 with its 3 filtration zones and 9 settling zones converts your septic tanks, tile fields, sand filters and other conventional treatment devices into advanced treatment solutions.
- The BK 2000 uses 6 Flow Equalization Ports to utilize upstream tank capacity, thus managing all heavy-use periods and hydraulic surges from clothes washers, dishwashers, water softeners, garbage disposals, baths, hot tubs, weekend guests and any other causes.
- With its unlimited design and installation flexibility, the BK 2000 serves a great variety of applications. All that's required is an area large enough to accommodate the Settling and Retention Basin and the connecting piping. Inlet and outlet piping connections are built-in, so installation is easily completed in just a few hours. There's no need for complicated excavation or landscaping. There are no complex pipe connections or electric hookups.
- The BK 2000 begins effectively managing up to 2,000 gallons of wastewater in its first day of operation. It will deliver a lifetime of protection.
- Only the BK 2000 combines filtration, solids retention and removal, flow equalization, optional chemical addition and simple maintenance for trouble-free, worry-free, long-term performance. The BK 2000 is installed with a 10-year warranty.
- U.S. and foreign patents are granted and pending.



#### **NSF Certified Chlorine Dispenser**

OUR DISPENSER MAKES IT EASY TO PROPERLY DISINFECT OR DECHLORINATE THE WASTEWATER FLOW. WHEN USED WITH OUR BLUE CRYSTAL OR BIO-NEUTRALIZER TABLETS, IT'S LISTED UNDER NSF/ANSI STD. 46, SECTION 11 FOR SAFE, EFFECTIVE USE



#### **Gasketed Rings and Extension Risers**

THEY ARE AVAILABLE FOR INSTALLATIONS THAT REQUIRE ADDITIONAL BASIN CAPACITY OR DEPTH. RINGS AND RISERS ARE AVAILABLE IN HEIGHTS FROM 6" TO 72" AS REQUIRED.



#### **Molded Lockable Compression Clamp**

IT LOCKS THE ACCESS COVER, RISER AND RING SECTIONS IN POSITION. THE CLAMP IS SECURED BY A STAINLESS STEEL FASTENER OR AN OPTIONAL PADLOCK



Norweco distributors are located throughout the United States and much of the rest of the world. Research, product development, manufacturing, marketing and sales support are conducted inside our offices and factory in Norwalk, Ohio. Everyone at Norweco is committed to shaping the future of our industry.

# engineering

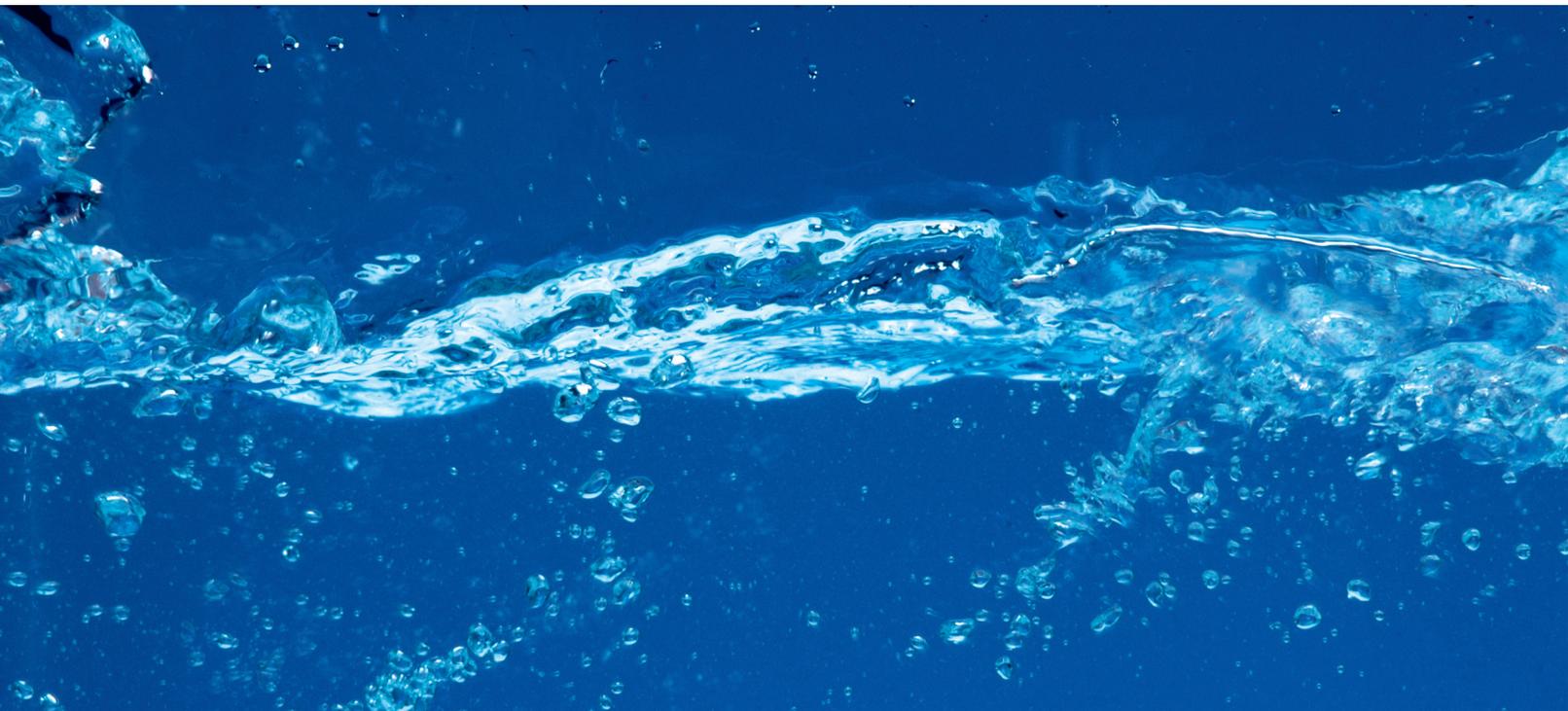
# the future

of water and wastewater treatment

## Specify BK 2000

Your local Norweco distributor is fully trained to install your BK 2000 System and any other Norweco product you choose to protect your environment. Our distributors have completed a nationally accredited BK 2000 factory-training program.

The BK 2000 System can be easily installed as part of any wastewater treatment system. The compact, easily transported basin is equipped with built-in connections for inlet and outlet piping, allowing installation to be completed in just hours. Extensive excavation work and revisions to existing landscaping are not required. There are no complex piping connections or electrical hookups. The BK 2000 System and its advanced treatment features begin working immediately.



## comprehensive protection, guaranteed



The BK 2000 is warranted against defects in material and workmanship under normal use and service for 10 full years. This limited warranty provides comprehensive, single source protection and covers all BK 2000 System components. Complete warranty information, a

Warranty Registration Card and Owner's Manual are included with purchase.

***norweco***<sup>®</sup>

*Engineering the future of water  
and wastewater treatment*

**220 Republic Street  
Norwalk, Ohio, U.S.A. 44857-1156  
PH: 419.668.4471  
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www.norweco.com**

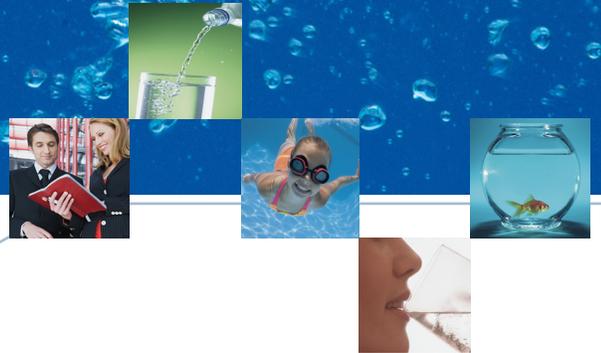
### Progress Through Service Since 1906

*We engineer, manufacture, install, and maintain advanced water and wastewater treatment technologies for residential properties, communities, and commercial properties that are not connected to sewer lines. Norweco treatment systems are in service everywhere in the world.*

*Norweco, Norweco.com, Singulair, Modulair, Travalair, Singulair Green, Ribbit Rivet, Hydro-Kinetic, Evenair, Lift-Rail, Microsonic, Bio-Dynamic, Bio-Sanitizer, Bio-Neutralizer, Bio-Kinetic, Bio-Static, Bio-Gem, Bio-Max, Bio-Per, Blue Crystal, Phos-4-Fade, ClearCheck, ChemCheck, Tri-Max, Hydra-Max, Service Pro, MCD, TNT, Grease Buster and "BUSTER" logo are all registered trademarks of Norwalk Wastewater Equipment Company, Inc.*

# AT 1500

## ULTRAVIOLET DISINFECTION



***norweco***<sup>®</sup>

*Engineering the future of water  
and wastewater treatment*



# AT 1500

the safe, **effective** and reliable way to  
disinfect in applications where ultraviolet  
(UV) treatment is **preferred**

Your complete solution to meet even the most stringent environmental permit requirements, the AT 1500 UV disinfection system reduces bacteria levels from secondary effluent to achieve strict water quality standards. The reliability and performance of the AT 1500 is unmatched for onsite and decentralized treatment applications. Every component of the compact unit is highly engineered and constructed to provide reliable disinfection and superior operational life.

UV disinfection is routinely used in ecologically sensitive areas where residuals from chemical disinfection might possibly create problems in the receiving environment. Harmful pathogens and other contaminants, including some that are resistant to chemical disinfection, are rendered completely harmless by the reliable performance of the AT 1500 UV disinfection system.

**solutions** in wastewater treatment



Norweco distributors are located throughout the United States and much of the rest of the world. Research, product development, manufacturing, marketing and sales support are conducted inside our offices and factory in Norwalk, Ohio USA. Everyone at Norweco is committed to shaping the future of our industry.

engineering

the future

of water and wastewater treatment

## Specify Norweco UV Disinfection

Equipped with an internal current sensing circuit that continuously monitors the performance of the UV bulb, the AT 1500 automatically provides notification if system operation is interrupted. This self-diagnostic feature protects the disinfection process from disruptions and maintains treatment quality. When used in conjunction with a Norweco remote monitoring controller, the system owner and service provider can be immediately notified of any change in performance.

The compact design and rigid construction of the system makes installation quick and easy. The treatment chamber is constructed from carbon-impregnated ABS plastic that is resistant to ultraviolet light and the engineered flow path assures disinfection quality.

# The AT 1500 UV disinfection system reduces bacteria levels to meet strict water quality standards

## Interlock Switch

A power interlock switch automatically de-energizes the system during service.

## Inlet

Treated wastewater enters the system through an integral 4" inlet hub.

## Turbulence Inducer

Turbulence is purposely created within the influent, accomplishing more complete disinfection.

## UV Bulb

The heavy duty, long-life bulb provides reliable disinfection. Our lamp is tested and certified to provide superior bacteria kill over competitive systems, while maintaining extended service life.

## Quartz Sleeve

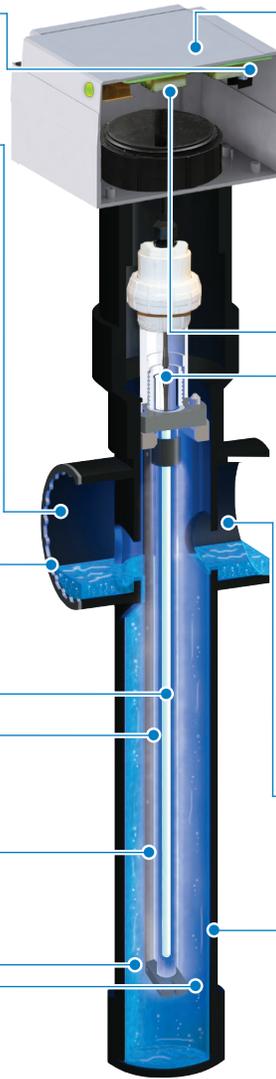
The long-life bulb is encased within a transparent quartz sleeve to isolate the bulb from the flow stream and allow for uniform heat dissipation.

## Teflon Cover

A flexible transparent Teflon cover, held in an anodized aluminum frame, creates the flow path for the AT 1500. Resistant to bio-film growth, the Teflon cover ensures maximum UV transmittance.

## Dual-Pass Design

Extended treatment time and exposure to UV light allow for maximum disinfection and performance for stringent environmental standards.



## NEMA 4X Electrical Enclosure with Internal Ballast

The compact electrical enclosure provides a watertight and weatherproof connection for all power lines to the system. The ballast is located safely inside this durable enclosure for protection and long-life. The green light located on the side of the enclosure is constantly lit to indicate proper operation.

## Solid State Circuit Board

Function of the system is fully solid state, with a current sensing circuit. The current sensor automatically monitors performance of the UV bulb and provides constant assurance of proper operation.

## Simplified Wiring

A single incoming power cable is the only electrical connection required to operate the AT 1500 system. The current sensing control center operates the bulb through a watertight pre-wired, plug and play power cable assembly.

## Outlet

Disinfected effluent exits the system through an integral 4" outlet hub.

## ABS Disinfection Chamber

The system is contained within an ABS disinfection chamber that is carbon-impregnated for maximum durability. The chamber is resistant to UV light and provides long operational life.



## NPDES Treatment System

UNIQUE, STATE-SPECIFIC TREATMENT NEEDS CAN BE MET WITH THIS EQUIPMENT PACKAGE. THE NPDES TREATMENT UNIT FOLLOWS ANY APPROVED NORWECO AEROBIC WASTEWATER TREATMENT SYSTEM AND INCREASES DISSOLVED OXYGEN (DO) TO ABOVE 6 PPM TO PROTECT THE MOST SENSITIVE RECEIVING ENVIRONMENTS.

## Pumping Stations

NORWECO'S SIMPLEX AND DUPLEX PUMPING STATIONS ARE A VERSATILE, DURABLE AND AFFORDABLE WAY TO SOLVE YOUR DOMESTIC FLUID HANDLING NEEDS. BASIC PRE-ENGINEERED PACKAGES INCLUDE A CORROSION RESISTANT POLYETHYLENE BASIN, PRE-WIRED ELECTRICAL CONTROL CENTER AND A WIDE SELECTION OF PUMPING EQUIPMENT.

## Blue Crystal® Residential Disinfecting Tablets

OUR PURE CALCIUM HYPOCHLORITE TABLETS ARE SPECIALLY FORMULATED FOR USE IN RESIDENTIAL SYSTEMS FOR EFFICIENT, RELIABLE DISINFECTION. EACH TABLET CONTAINS AT LEAST 70% AVAILABLE CHLORINE. PACKAGED IN RE-SEALABLE CONTAINERS, OUR TABLETS ARE AVAILABLE FROM YOUR LOCAL NORWECO DISTRIBUTOR IN 1.9, 10 AND 100 POUND POLYETHYLENE PAILS.

We are committed to helping you keep your customers safe and the environment clean. The AT 1500 is the only UV treatment system listed with Underwriters Laboratories (UL) for residential disinfection applications.

# customer focus



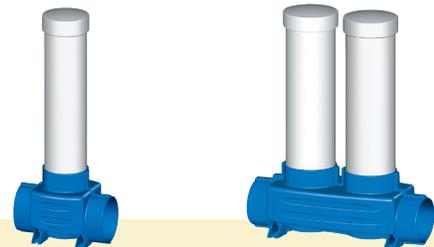
## Consider the facts:

- Dual-pass design assures the integrity of the treatment process. All liquid flowing through the system is treated twice by the UV lamp, once on the way down and again on the way back up. This doubles the exposure to UV light and greatly improves treatment.
- All electrical components are contained in a NEMA 4X weatherproof electrical enclosure. These components control the disinfection process and assure treatment integrity. The gasketed cover is secured with screws to seal the enclosure.
- Our long-life lamp is designed and tested to be superior to competitive products currently used in onsite wastewater treatment. The bulb is stronger and provides more complete disinfection.
- The lighting ballast is contained within the gasketed electrical enclosure to assure maximum life. Competitive systems leave the ballast exposed to the treatment environment.
- Disinfection quality is assured by a corrosion resistant solid state circuit board that continually monitors system performance. A current sensing circuit automatically gives immediate notification should a service interruption occur.
- Easy to install and maintain. The entire UV process is contained within a convenient ABS disinfection chamber. Optional concrete or high-density polyethylene enclosures are also available to provide additional treatment.
- No chemical residual or harmful by-products. The AT 1500 UV disinfection system provides superior treatment and its performance is independent of the pH, temperature and ammonia content of the effluent being treated.
- Low electrical usage. The high efficiency electrical controls use very little electricity.
- Inexpensive to install and operate. The AT 1500 can be installed for less than some chemical feed systems, and requires no recurring chemical purchase. The only maintenance requirement is periodic cleaning of the Teflon cover.
- Can be used to eliminate contaminants not readily removed by chemical treatment. Advanced Oxidation Processes (AOP) can be constructed by supplementing the AT 1500 system with ozone or H<sub>2</sub>O<sub>2</sub> to remove chemical resistant pollutants, such as certain pharmaceuticals and methyl tertiary butyl ether (MTBE).



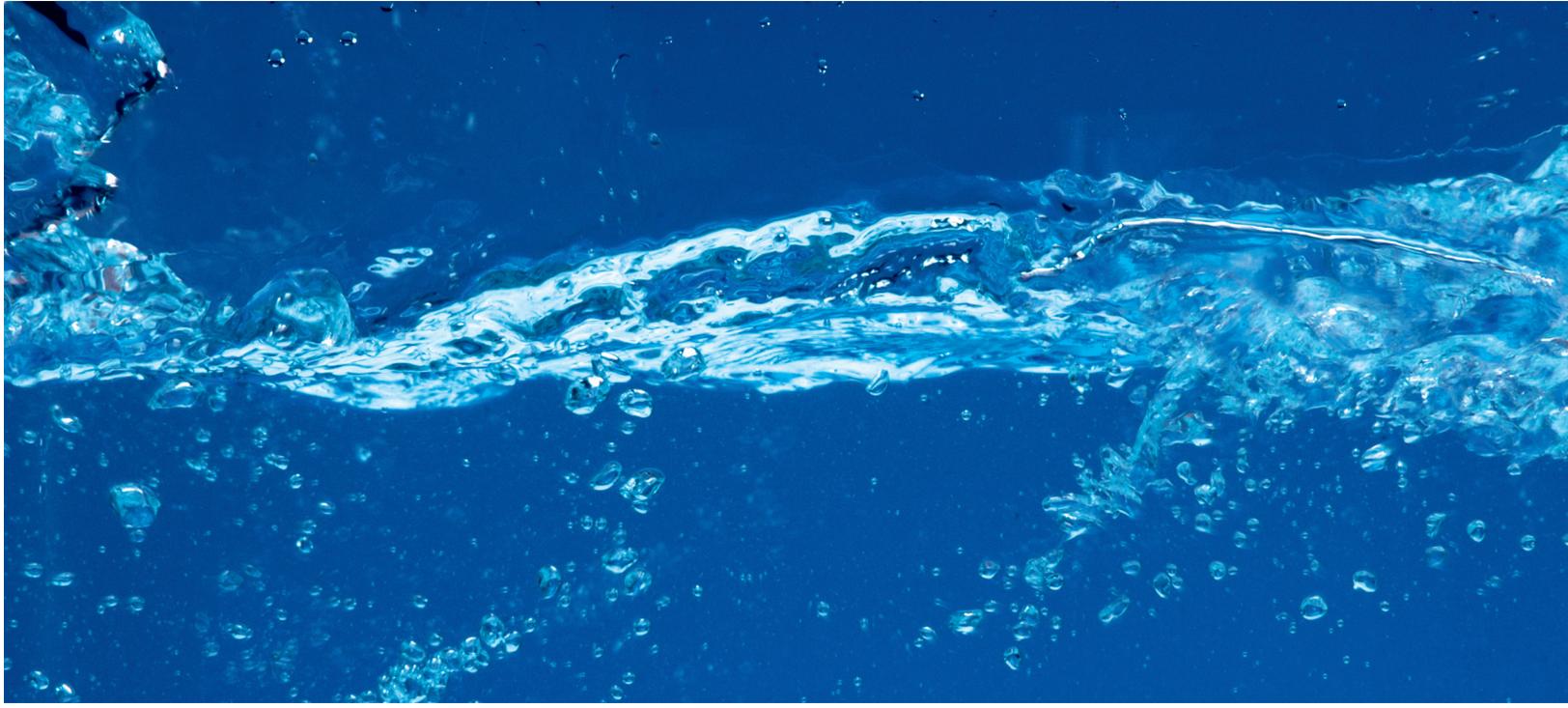
### Bio-Max® Dechlorination Tablets

BIO-MAX DECHLORINATION TABLETS PROVIDE A CONVENIENT SOURCE OF CONCENTRATED SODIUM SULFITE TO INSTANTLY REMOVE ALL FORMS OF CHLORINE FROM WASTEWATER, POTABLE WATER AND PROCESS WATER. CONTAINING 92% SODIUM SULFITE AS ACTIVE INGREDIENT AND 8% PROPRIETARY INERT INGREDIENTS, BIO-MAX TABLETS CAN BE USED IN ALL BRANDS OF GRAVITY OR PRESSURIZED TABLET FEEDERS.



### Bio-Dynamic® Tablet Feeders

BIO-DYNAMIC TABLET FEEDERS PROVIDE LOW COST, EFFECTIVE DISINFECTION AND DECHLORINATION OF SECONDARY EFFLUENT IN LESS SENSITIVE RECEIVING ENVIRONMENTS. EMPLOYING FLOW PROPORTIONAL CHEMICAL DOSAGE WITHOUT MOVING PARTS OR ELECTRICAL COMPONENTS, THE COMPACT TABLET FEEDERS INSTALL EASILY AND PROVIDE UNMATCHED DURABILITY.



## comprehensive protection, guaranteed



The AT 1500 disinfection system is warranted against defects in material and workmanship under normal use and service by a comprehensive 2 year warranty. This limited warranty provides single source protection and covers all system components. A warranty registration card is included with every new AT 1500 Installation and Operation Manual.

The Model AT 1500 UV disinfection system has been listed with Underwriters Laboratories as a residential treatment device.



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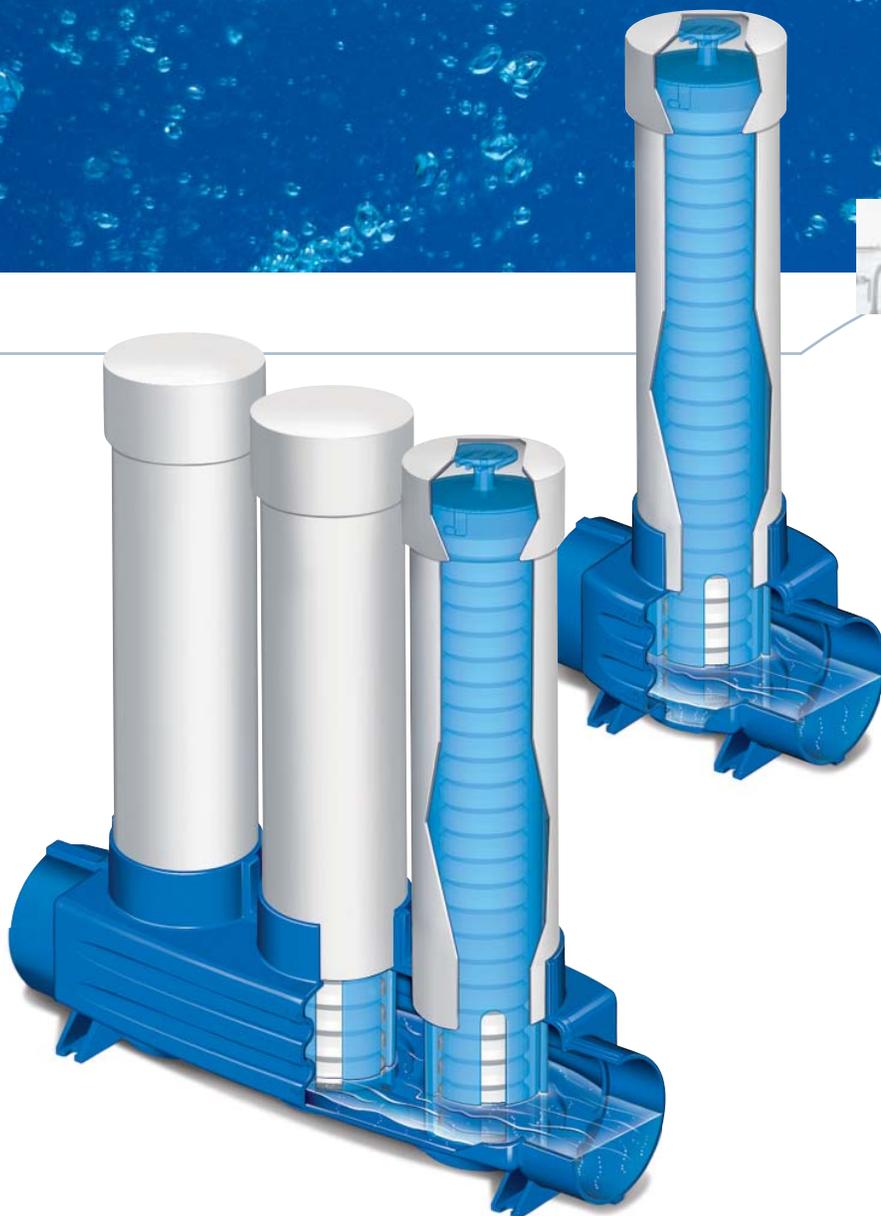
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# BIO-DYNAMIC<sup>®</sup>

DRY CHEMICAL TABLET FEEDERS  
AND TABLETS



***norweco***<sup>®</sup>

*Engineering the future of water  
and wastewater treatment*

A photograph of three business professionals (two men and one woman) in a meeting, looking at a document. The image is overlaid with a blue gradient and the Bio-Dynamic logo.

# BIO-DYNAMIC<sup>®</sup>

The **safe**, effective and  
economical **way** to consistently  
disinfect and dechlorinate  
water and **wastewater**

We engineered our Bio-Dynamic tablet feeders to provide effective flow proportional chlorination and dechlorination for water and wastewater treatment. Compact, easily installed and virtually indestructible, Bio-Dynamic tablet feeders contain no mechanical or failure-prone electrical components. Incorporating Norweco's exclusive multi-tiered flow deck to automatically regulate chemical delivery, Bio-Dynamic tablet feeders make traditional liquid chemical feeders and ultraviolet technology obsolete. Recommended by governmental, charitable and academic organizations world-wide, Bio-Dynamic tablet feeders reinforce Norweco's reputation for providing today's solutions for tomorrow's environment.

**solutions** in wastewater treatment



Norweco distributors are located throughout the United States and much of the rest of the world. Research, product development, manufacturing, marketing and sales support are conducted inside our offices and factory in Norwalk, Ohio USA. Everyone at Norweco is committed to shaping the future of our industry.

engineering

the future

of water and wastewater treatment

## Specify Norweco® Bio-Dynamic® Dry Chemical Tablet Feeders and Tablets

With fifteen different models of Bio-Dynamic tablet feeders available, design engineers have unprecedented flexibility in specifying a feeder ideally suited for their treatment requirements. Multiple installation options include direct burial, in-line and contact chamber mounting. Combine these options with a small unit footprint and you can see how quick and easy Norweco has made installation, even in the tightest areas.

From project inception through final plan review, procurement, installation and operation, Norweco's team of experienced engineers and customer service personnel are available to assist you with your project. Backed by an extensive library of drawings, project research and decades of hands-on experience, we focus on keeping you on schedule and under budget.

# The exclusive multi-tiered flow deck delivers consistent chemical treatment, regardless of flow rate

Flow surges are common in any treatment system. This variation in flow rate can cause major problems for conventional tablet feeders and manually adjusted gas or liquid chemical feed systems. That's why we engineered a multi-tiered flow deck to enhance the fluid dynamics of the liquids passing through the system. During low flow, usually at night, liquids are directed through the inert drainage tier, the lowest tier of the feeder. It forms a narrow

hydraulic channel that increases the velocity of the flow for uniform tablet exposure. When flow increases during morning hours, the liquid flow rises to the intermediate flow tier. It creates a flume to accelerate the flow passing the tablets. When the flow rate is greater than the capacity of this intermediate tier, liquids rise to the upper flow tier. That tier causes the liquid to lose velocity, preventing excessive tablet consumption.



## Compact LF Series Bio-Dynamic® tablet feeders provide a strong chemical dose – ideal for onsite systems.



Compact Bio-Dynamic LF Series tablet feeders provide a chemical dose that is ideal for potable water and wastewater systems subject to high organic loading. Manufactured from ABS for durability and easy installation, integral inlet and outlet hubs accept four, six or eight inch piping. LF Series feeders are typically used for residential or small commercial onsite

applications, stormwater treatment or remote potable water systems. Five different models are available to accommodate flows from 500 GPD through 400,000 GPD.

LF Series feeders range in length from 10 to 24½ inches, and 7 to 12 inches in width. The 22½ inch tall, one piece feed tubes are designed to fit inside standard 4" PVC piping, allowing all LF Series feeders to be surface installed or direct buried. For deeper installations, our optional remote feed tube removal system allows convenient feeder maintenance from grade.

# The Series 2000 and Series 4000 tablet feeders provide precise chemical dosage with adjustable baffles, weirs or outlet sluice.

For flows ranging from 200 GPD through 100,000 GPD, Bio-Dynamic Series 2000 tablet feeders can treat gravity influent up to 70 GPM. 25½ inches in length, 10½ inches in width and ranging in body height from 12 inches through 48 inches, five different models of Series 2000 feeders are available for different installation conditions. Additional 24 inch risers are available for direct burial installations up to 10 feet. Choose between interchangeable weirs or Norweco's outlet sluice, for desired dosage control.

Treatment capacities from 20,000 GPD through 200,000 GPD with a maximum flow of 150 GPM, give Bio-Dynamic Series 4000 feeders the capability to treat flow from a wide range of facilities. With a length of 35¾ inches, a width of 14½ inches and body heights ranging from 12 inches through 48 inches, five different models of Series 4000 feeders are available for different installation conditions. Additional 24 inch risers are available for direct burial installations up to 10 feet. Interchangeable weirs and Norweco's adjustable outlet sluice are available to maximize your feeder's performance.



XT 2000



XT 4000



IT 2000



IT 4000



ITR 2000-S



ITR 4000-S

***"Chlorine addition by tablet feeders is likely to be the most practical method for chlorine addition for onsite applications."***

— USEPA Office of Research and Development,  
*Onsite Wastewater Treatment Systems Manual TFS-21*

maximize

performance

of water and wastewater treatment

# Uniquely formulated Bio-Sanitizer® Disinfecting Tablets deliver consistent and inexpensive bacteria killing power

Bio-Sanitizer disinfecting tablets are uniquely formulated to provide a consistent dose of chlorine in response to water or wastewater velocity. Containing a minimum of 70% available chlorine and produced in a convenient to use tablet form, Bio-Sanitizer enables plant operators to meet stringent disinfection standards in a safe and economical manner. Recommended for use in Norweco Bio-Dynamic tablet feeders, Bio-Sanitizer tablets will improve the performance of any type of tablet dosing system. Registered with the USEPA, the Canadian Ministry of Environment and a number of state and provincial authorities, Bio-Sanitizer tablets are packaged in easy to open 10, 25, 45 and 100 pound containers.



# To remove both free and combined chlorine for water and wastewater, use our Bio-Max® Dechlorination Tablets



Bio-Max dechlorination tablets provide a convenient source of concentrated sodium sulfite to instantly remove chlorine from wastewater, potable water and process water. They contain 92% sodium sulfite as an active ingredient and 8% patent pending inert ingredients. Produced for use in all models of Bio-Dynamic tablet feeders, Bio-Max tablets can also be used in all major brands of gravity or pressure dosing units.



Bio-Gem®



Blue Crystal®



Bio-Neutralizer®



Bio-Perc®

# customer focus

Norweco's technical and customer service personnel put decades of experience in wastewater treatment at your disposal. Committed to long term customer satisfaction, our support staff is always available to assist you with the use of Norweco products.



## The pure facts about safe, consistent chemical application

- Bio-Dynamic tablet feeders provide effective treatment without the use of mechanical components or electrical connections.
- All Norweco tablet feeders automatically adjust chemical dose in response to changes in daily influent rates and velocity.
- By directing and controlling the velocity of the incoming flow, our exclusive multi-tiered flow deck provides consistent chemical application at sustained, variable and intermittent flow rates.
- Fall built into the floor of Bio-Dynamic feeders allows the units to drain during no flow conditions. This stabilizes the chemical dose and minimizes chemical usage.
- Inlet and outlet hubs in 4", 6" and 8" diameters simplify installation and eliminate the use of costly drop boxes and couplings.
- Bio-Dynamic tablet feeders have a much smaller footprint than any other means of disinfection or dechlorination. This will result in significant design and installation savings.
- All Norweco tablet feeders provide multiple installation options including direct burial, in-line and contact chamber mounting with aluminum mounting brackets.
- The LF Series of Bio-Dynamic tablet feeders are produced from ABS for unmatched durability and ease of installation.
- A variety of optional extension risers and accessories allow Bio-Dynamic tablet feeders to be direct buried up to 10' and still accessible and maintainable from grade, eliminating confined space entry requirements.
- Our molded one-piece ClearCheck feed tubes are extremely durable and have twist-lock caps for safe handling of tablets and dependable performance.
- In the Series 2000 and 4000 tablet feeders, chemical dose is precisely regulated by an adjustable inlet baffle, interchangeable weir plates or optional outlet sluice.
- Norweco's Bio-Sanitizer disinfecting tablets and Bio-Max dechlorination tablets maximize the performance of Bio-Dynamic feeders.
- All Bio-Dynamic tablet feeders and treatment chemicals are listed under NSF Standard 46, Section 11 test criteria.
- To insure complete chemical mixing, all outflow passes through the feeder's hydrodynamic mixing chamber.
- Our tablet feeder customers are protected by a ten year limited warranty.
- Bio-Dynamic tablet feeders have the lowest initial cost of any commercially available disinfection or dechlorination system.
- All models of Bio-Dynamic tablet feeders are used for wastewater, potable water, process water and cooling tower water treatment.

Today's Answer for the Protection of Tomorrow's Environment



## comprehensive protection, guaranteed



Bio-Dynamic Tablet Feeder owners are protected from defects in material and workmanship under normal use and service for a full ten year period. A warranty registration card is included with every new tablet feeder Installation and Operation Manual.

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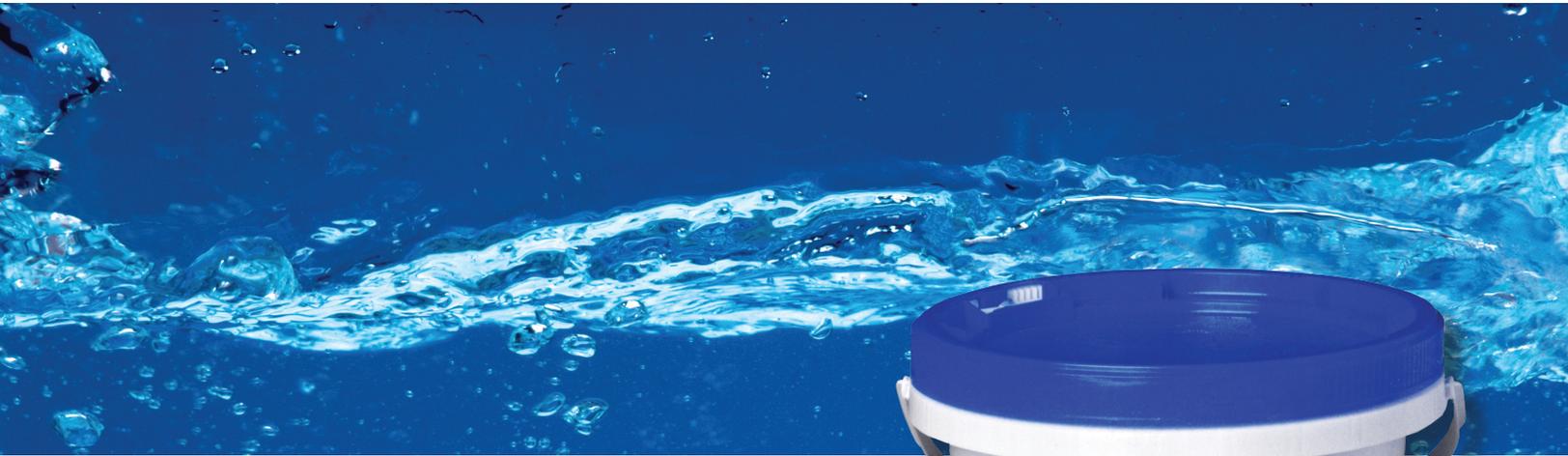
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# Blue Crystal® Residential Disinfecting Tablets

**norweco**®  
Engineering the future of water  
and wastewater treatment



Blue Crystal disinfecting tablets are the first microbicide specifically developed for use in residential wastewater treatment applications. Using a proprietary grade of calcium hypochlorite as the active ingredient, Blue Crystal tablets are manufactured to provide a consistent chlorine dose. To insure the effective treatment of residential wastewater flows, Blue Crystal tablets automatically adjust their dissolve rate in direct proportion to the rate of incoming flow. Residential treatment plant owners and operators can finally meet regulatory disinfection requirements with a product that is inexpensive, safe and easy to use. Formulated to maintain positive disinfection during low, sustained, variable and intermittent flow rates that are common to residential systems, Blue Crystal disinfection tablets provide a very quick, effective and long-lasting bacteria kill.

Safe to use in all domestic wastewater treatment systems, Blue Crystal tablets are approved and listed with the United States Environmental Protection Agency for the treatment of wastewater. Designed to provide rapid disinfection, the potent formulation of Blue Crystal reduces 99% of bacteria within the first ten minutes of contact. Blue Crystal tablets help maintain wastewater pH levels above 6.8 and dissipate quickly after complete disinfection, leaving no hazardous by-products in the effluent. Acid based products, such as common swimming pool tablets, disinfect slowly and produce a non-degradable chlorine residual while lowering effluent pH. Even occasional use of these acid based products in wastewater treatment can result in the discharge of inadequately treated wastewater and create potentially harmful or hazardous gases. Blue Crystal tablets set a new performance standard for disinfection by offering the highest level of effectiveness, convenience and safety for homeowners, regulatory officials and the environment.

(Continued on reverse)

## Advantages

- Specifically formulated for residential treatment systems
- Maintains disinfection in low and intermittent flows
- Economical and convenient to use
- Blue crystals for easy identification
- Promotes a stable pH level
- U.S.E.P.A. approved for wastewater treatment

## Specifications

Tablet Size	2 5/8" diameter, 1" thick
Approx. Tablet Weight	5 oz. (140 grams)
Approx. Tablet Density	125 lbs./ft. <sup>3</sup>
Active Ingredient	Calcium Hypochlorite Ca (OCl) <sub>2</sub> • H <sub>2</sub> O
Available Chlorine	70%
Inert Ingredients	30%
Appearance and odor	White tablet with blue crystals and mild chlorine odor
U.S.E.P.A. Registration	63243-4

## Caution

Blue Crystal disinfecting tablets are a strong oxidizing agent and highly corrosive. Use or contact with oils, acids, petroleum products, reducing agents or other compounds, such as swimming pool tablets, is extremely dangerous - fire or explosion could result. Improper use of this product may cause personal injury or property damage. Tablets may be fatal if swallowed and tablet dust is irritating to the eyes, nose and throat. Keep out of the reach of children and do not allow tablets or feed tubes to contact skin, eyes or clothing. Do not handle the tablets or feed tubes without first contacting your local distributor and obtaining specific instructions for usage, handling and storage. Store only in sealed original container and in a well-ventilated area. Read the product container label carefully prior to use. It is unsafe and a violation of Federal law to use Blue Crystal disinfecting tablets in a manner inconsistent with its labeling.

**Bio-Dynamic®**  
LF 1000  
Tablet Feeder



**Bio-Sanitizer®**  
Disinfecting  
Tablets



**Bio-Max®**  
Dechlorination  
Tablets



**Bio-Neutralizer®**  
Dechlorination  
Tablets



**Bio-Perc®**  
Biological  
Remediation  
Tablets



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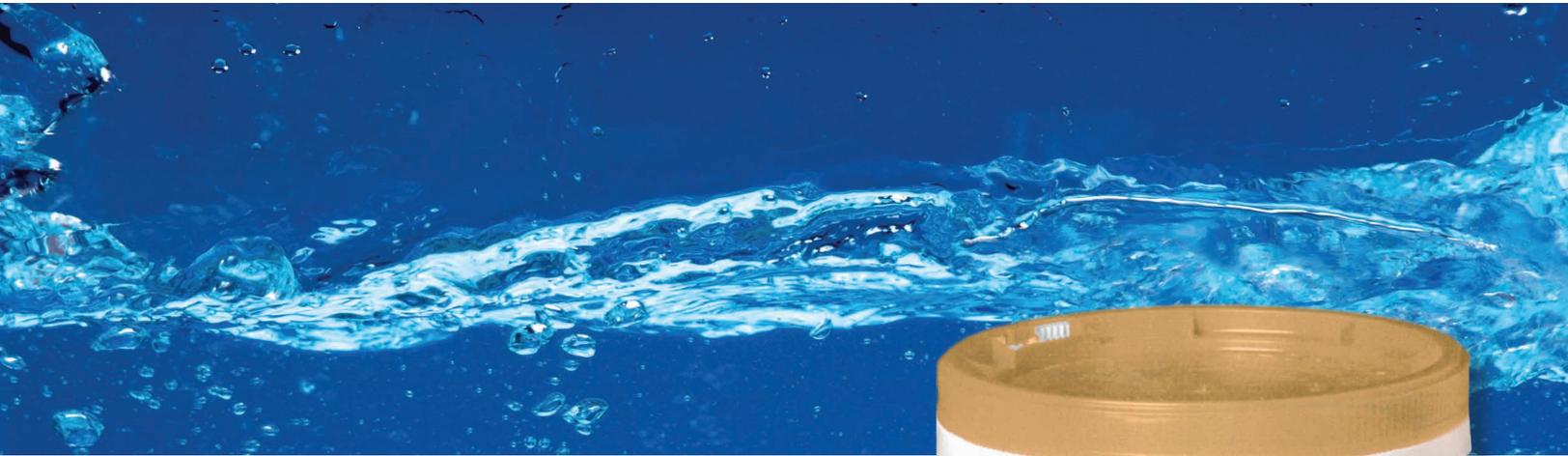
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# Bio-Perc® Biological Remediation Tablets

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Engineering the future of water  
and wastewater treatment



Bio-Perc biological remediation tablets rejuvenate failing wastewater treatment systems by reducing or eliminating organic buildup in distribution lines and disposal processes. Formulated for use in all residential and small commercial treatment systems, Bio-Perc tablets enhance the operational life of leach fields, surface sand filters, subsurface sand filters, sand trenches, cesspools, mounds, low pressure distribution systems, evapotranspiration beds, constructed wetlands, septic tank effluent pump (STEP) systems and any other type of system prone to failure from the buildup of organic solids. When incorporated into a regular maintenance program, Bio-Perc tablets restore failing wastewater treatment systems to proper operation and prevent the failure of new systems.

Sand filters and soil-based disposal systems often receive more organic material than they can oxidize. Excessive organic loading reduces system capacity and ultimately leads to the total failure of the treatment system. Chemical shock treatments or mechanical remedies, such as blasting the tile field with high pressure air or water, are expensive and the benefits last only a short time. Bio-Perc tablets provide continuous, long-term treatment and are safe, easy and economical to use.

Bio-Perc tablets add billions of beneficial microorganisms to accelerate the biological digestion that naturally occurs in wastewater disposal systems. Dissolving in direct proportion to the incoming flow rate, Bio-Perc tablets can be dosed by any gravity-flow feeder or added directly into a distribution box, pump station or dosing chamber. Providing continuous treatment on demand, Bio-Perc tablets allow failing treatment systems to function as originally designed for only a fraction of the replacement cost. Bio-Perc biological remediation tablets are available from your local Norweco dealer or distributor in a conveniently packaged, DOT approved and child resistant 10 lb. resealable polyethylene pail.

*(Continued on reverse)*

## Advantages

- Environmentally safe when used as directed
- Protects against premature system failure
- Doses automatically based on flow rate
- Effective for all effluent disposal systems
- No excavation or heavy equipment required
- Economical and easy to use

## Specifications

Tablet Size	2 5/8" diameter, 1" thick
Approx. Tablet Weight	5 oz. (140 grams)
Approx. Tablet Density	125 lbs./ft. <sup>3</sup>
Active Ingredient	Select bacteria cultures
Bacteria Count	220 billion/pound
Inert Ingredients	Dissolve rate stabilizers
Appearance and odor	Bronze tablet with mild odor
U.S.E.P.A. Designation	Non-Hazardous

## Caution

Bio-Perc biological remediation tablets are a proprietary, non-hazardous bacterial additive for wastewater treatment. Do not use this product in a manner inconsistent with its labeling. Do not contaminate food, feed or potable water with this product. Avoid contact with skin, eyes, mouth, respiratory system and clothing. Do not mix with acids or alkaline compounds. Use gloves and eye protection when handling tablets. Avoid inhalation of dust or vapors. Keep out of the reach of children. Extreme heat or extreme cold will affect product performance. Store only in sealed original container in a well-ventilated area. Do not handle Bio-Perc tablets or feed tubes without first contacting your local distributor and obtaining specific instructions for usage, handling and storage. Exercise care when removing tablets from container or filling feed tubes to prevent moisture contamination. Read the product container label carefully prior to use. Do not reuse empty container.

**Bio-Dynamic®  
LF 1000**  
Tablet Feeder



**Bio-Sanitizer®**  
Disinfecting  
Tablets



**Bio-Max®**  
Dechlorination  
Tablets



**Blue Crystal®**  
Residential  
Disinfecting  
Tablets



**Bio-Neutralizer®**  
Dechlorination  
Tablets



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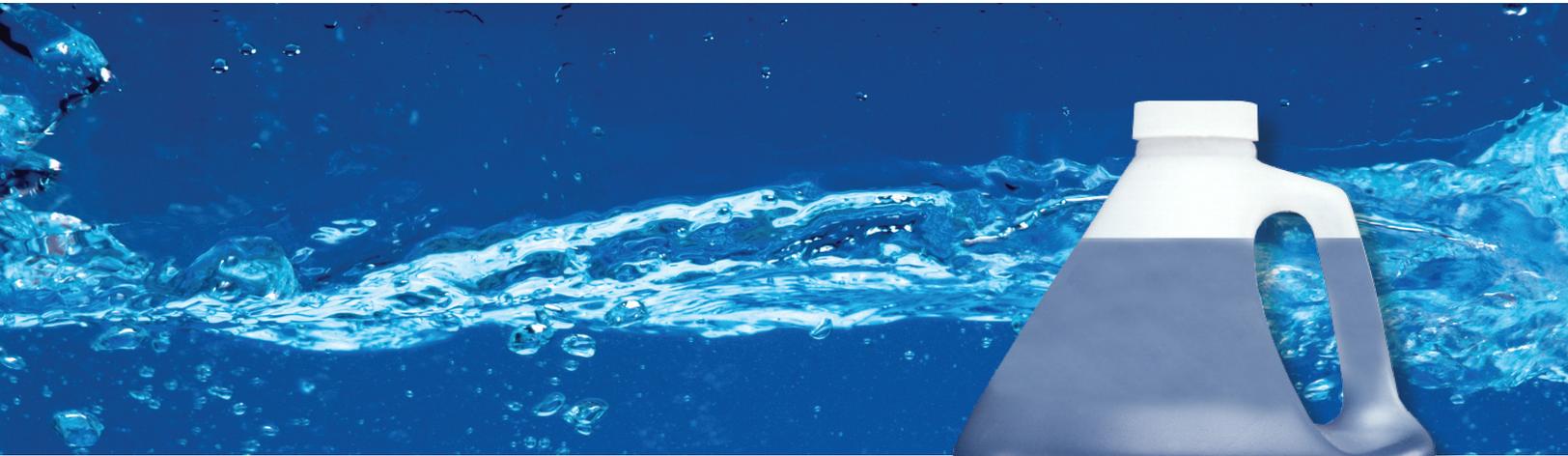
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# Bio-GEM® Grease Eliminating Microbes

**norweco®**  
Engineering the future of water  
and wastewater treatment



Bio-Gem is a patented blend of cultured bacteria, aggressive enzymes and natural growth accelerators developed to effectively digest grease, fats and oils in wastewater treatment systems, lift stations, sand filters, drain lines and grease traps. Regular use of Norweco's Bio-Gem can reduce or eliminate costly line plugs, pump outs and municipal surcharges. Maintenance procedures that involve jetting of clogged lines or the use of harsh commercial degreasers often damage equipment and contaminate groundwater. Completely safe, effective and convenient to use, Norweco's Bio-Gem is a natural way to eliminate grease, fats and oils throughout your treatment system.

Bio-Gem is a patented Bio-Enzymatic product specifically formulated to digest grease, fats and oils in wastewater treatment systems, lift stations, sand filters, drain lines and commercial grease traps. When used as directed, Bio-Gem's bacterial action will quickly and effectively convert common grease, fats and oils into carbon dioxide and water. With regular applications, Bio-Gem eliminates odors, stabilizes effluent quality, significantly reduces system maintenance and minimizes costly tank pump outs.

The multifaceted treatment provided by Bio-Gem is achieved through the use of recently developed biological techniques that combine concentrated spore forming microorganisms, aggressive enzymes and natural growth accelerators into a stable, easy to use liquid. Norweco's three-fold formulation provides an advanced method of actually treating and eliminating grease, fats and oils instead of merely emulsifying them and sending the problem downstream.

*(Continued on reverse)*

## Features

- Environmentally safe when used as directed
- High bacteria count
- Multifaceted biological blend provides complete treatment
- Economical and easy to use
- Works in aerobic or anaerobic conditions
- Long term storage stability (2 to 4 years)
- Eliminates odors
- Fast acting
- Reduces maintenance and pumping frequency

## Specifications

Bacteria Count	550 Billion/Gallon
Appearance	Blue Liquid
Fragrance	Herbal Scent
Type	Aerobic and Anaerobic Pathways
Form	Spore
Gram-Positive	100% (Salmonella and Shigella Free)
Standard Packaging	Gallon bottles (4-1 gallon bottles per case)
Shelf Life	2-4 years

## Application and Dosage

Bio-Gem is an easy to use concentrated liquid which can be dosed directly into the system. Application rates for Bio-Gem are dependent upon the type of system being treated, its condition and the flow through the system. Basic application rates for drain lines start at 10 to 12 oz. per day. For medium volume grease traps (65-200 cubic feet), a rate of 18 to 20 oz. per day is recommended. Lift stations, wet wells and wastewater treatment plants are dosed at the ration of 18 to 25 oz. per 10,000 gallons of flow. For severely fouled systems contact your local Bio-Gem distributor or Norweco, Inc. for the best application rate for your system.

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# EFFLUENT SAMPLING FOR RESIDENTIAL TREATMENT SYSTEMS

For various reasons, many wastewater treatment systems periodically require effluent sampling and characterization. Whether sampling is done to verify compliance with specific effluent limits or simply to indicate if the system is operating properly, effluent sampling must follow specific procedures and guidelines to insure accuracy. Analysis of improperly collected or contaminated effluent samples will result in data that could lead to an incorrect conclusion regarding treatment system operation. Conversely, laboratory analysis of properly collected effluent samples will generate data that can be used to evaluate actual treatment system performance. *“The objective of sampling is to collect a portion of material small enough in volume to be transported conveniently and yet large enough for analytical purposes while still accurately representing the material being sampled.”*<sup>1</sup> Wastewater sampling is generally performed by one of two methods, grab sampling or composite sampling. Each method has specific limitations on what tests can be performed and how the data is used.

## GRAB SAMPLING

A grab sample (sometimes called an individual discrete sample) indicates that all of the test material is collected at one time. Grab samples are collected by manually removing a quantity of effluent from the flow stream at a single point in time during the flow day. As such, a grab sample reflects the effluent conditions only at the point in time the sample was collected. Therefore, by definition, a single grab sample can never be used for long term performance evaluation of a wastewater treatment system. However, there are a number of very specific places where grab sampling must be used. *“Grab samples serve to characterize variations of the waste stream over time. They also allow analysis of unstable parameters soon after sample collection. Examples of such parameters include pH, dissolved oxygen (DO), chlorine residual [and] temperature.”*<sup>2</sup>

## COMPOSITE SAMPLING

Composite sampling consists of collecting, at specific time or volume intervals, a number of individual samples in one single container. Composite samples are almost always collected by the use of automated sampling and storage equipment, which will refrigerate the sample over the entire time of collection. A composite sampler withdraws a small volume of effluent periodically throughout the sampling period, usually 24 hours. This equipment is designed to automatically purge the sampling pump, transfer a programmed amount of effluent into a single storage container and purge the sampling apparatus again to remove material that could affect the results. Usually, refrigeration of the composite sample must continue during the entire time of collection and transportation to the laboratory. In order to prepare the sample for analysis, the total volume of composited effluent is thoroughly and completely mixed. Collected and analyzed in this manner, the blended composite sample represents the wastewater characteristics over the entire time or the specific volume of flow.

## GRAB SAMPLING VS. COMPOSITE SAMPLING

Monthly operating reports, performance evaluations or compliance monitoring forms (used by municipal treatment systems) usually record performance data as individual daily values. In most cases, these data points represent the analysis of a composite effluent sample collected over a 24 hour period. As these results are shown by a single value, individual daily data points are frequently confused with data from grab samples. However, a composite sample consisting of a quantity of programmed individual collection events is not the same as one or more grab samples. A proper composite sample will result in one data point that represents the effluent quality over the time of collection or volume of flow. Even when the data from grab samples is averaged, that one data point represents the effluent flow only at specific moments in time when the samples were collected. Due to the differences in how the samples are typically collected and analyzed, an average of multiple grab samples does not provide valid information regarding system operation and performance the way composite sampling does.

The analysis of grab samples is necessary for certain effluent parameters, but the primary indicators of system performance including CBOD<sub>5</sub> (carbonaceous five day biochemical oxygen demand), TSS (total suspended solids) and TN (total nitrogen) require the collection and analysis of 24 hour composite samples. The cost and logistics of proper composite sample collection make it tempting to use grab samples for all evaluations. Performance testing by grab sampling is a blatant misapplication of technology and has no basis for use with treatment systems of any size. However, it is even more inaccurate when used with residential treatment systems. The residential sewage characteristics and flow patterns compound the degree of error when residential treatment system performance is judged by the use of a grab sample. The table on page six lists specific effluent parameters and whether grab or composite sampling is required for proper evaluation.

# EFFLUENT SAMPLING FOR RESIDENTIAL TREATMENT SYSTEMS (Page 2 of 6)

## MUNICIPAL FLOW PATTERNS

Municipal wastewater treatment systems receive their flow over a 24 hour period, and the volume and strength characteristics of the incoming waste vary over the daily flow pattern. By their nature, biological treatment systems fluctuate slightly in their performance due to the growth and lag phases of the microorganisms, particularly if there are large fluctuations in the volume and strength of the influent during different periods of loading. Both of these factors result in a varying amount of impurities contained in the effluent discharged from these treatment systems over the course of the day. In municipal systems, these variations are minimized by the blending of incoming waste from a number of different homes or sources combined into one treatment system of very large capacity. Even so, the Water Environment Federation recommends that all of the primary performance indicators for municipal systems be evaluated by using composite effluent samples.

## RESIDENTIAL FLOW PATTERNS

Residential treatment units receive a frequent number of short hydraulic surges throughout the day followed by intermittent periods of no flow whatsoever. Additionally, the wastewater characteristics range from nearly potable water characteristics (i.e. rinsing fresh vegetables), to graywater from doing laundry and dishes, to full strength sewage. There is little opportunity for these individual flows to be blended into a homogenous flow stream of average characteristics. The changing volume and strength of the wastewater will maximize normal fluctuations in the effluent produced by the treatment system. For example, flow surges that are present in most individual home flows will often create a washout of substantial amounts of treatment system suspended solids.

Therefore, a grab sample of the effluent taken at only one specific time throughout the daily flow pattern is not representative of system performance over the entire day. *“Failure to obtain a representative sample can produce invalid data, leading to erroneous process control decisions.”*<sup>2</sup> The type and quantity of samples collected should be determined by the data required. For example, the Code of Federal Regulations stipulates that the performance of secondary treatment systems should be evaluated by tabulating 30-day averages of system effluent. As it is impossible to judge long term treatment system performance by a single discrete grab sample, or even a single 24 hour composite sample, a 30-day regimen of proper samples must be collected, analyzed and tabulated before system performance can be evaluated.

It is wholly inaccurate, bad science and irresponsible to evaluate system performance by the analysis of data collected from one, or even several, effluent grab samples. The most widely used performance evaluation for residential treatment units (NSF/ANSI Standard 40) evaluates performance by tabulating data collected via composite

sampling techniques. Each individual daily composite sample is collected over 24 hours by withdrawing an aliquot (a measured volume of sample) of effluent at 80 separate times throughout the day. If samples were collected every calendar day, each 30-day average applied to the pass/fail criteria would actually represent 2,400 individual sampling events, collected over an entire month.

Statistically, this could present some interesting possibilities for any program requiring 30-day averages. Theoretically, an individual daily composite sample could have test results as high as 871 mg/L TSS and still compute to a 30-day average of 30 mg/L. Within the single composite sample analyzed at 871 mg/L, an individual aliquot (the equivalent of a grab sample) could contain as high as 69,601 mg/L and still be analyzed as a daily composite sample of 871 mg/L. Of course, this is a practical impossibility. However, it does demonstrate that an individual grab sample parameter could test excessively high, and yet the system could still be operating in compliance with federal standards or better. Considered individually, a number of grab samples taken from a residential treatment unit might appear to indicate a system that is not operating properly, when in reality, the average effluent could actually be of very high quality. Composite samples, while requiring electromechanical equipment and more complex sampling methods, will provide the only accurate indicator of system performance. For these reasons, professional wastewater treatment system operators and third party certifiers continue to rely on composite sampling in order to conduct evaluations that accurately measure system performance.

## SAMPLING PROCEDURES

Proper collection of an effluent sample, by either technique, requires specific procedures to be followed. A grab sample of effluent must be a free falling sample, collected from a cleaned effluent pipe, in a proper sample bottle, stabilized during transport, stored for a limited period of time and analyzed by specific laboratory methods. When using a composite sampler, follow the manufacturer's instructions to insure an accurate, representative sample is collected. An automatic sampler may require withdrawing the sample from a pipe or channel that is cleaned daily. Samples should be collected *“at points where the sample stream or tank is well mixed.”*<sup>3</sup> This insures the effluent is moving with enough velocity to prevent the settling out and accumulation of solids. If solids are allowed to settle and accumulate, as would occur in any effluent sump, sampling previously accumulated solids mixed with the effluent is not representative of either past or current operating conditions.

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## EFFLUENT SAMPLING FOR RESIDENTIAL TREATMENT SYSTEMS (Page 3 of 6)

Whether collecting a grab sample or preparing a composite sample for analysis, proper procedures must be followed:

- 1) Personal safety should be the first consideration in any sampling protocol. The same safety precautions exercised in any area of wastewater treatment should be taken during effluent sample collection. Proper eye protection and disposable gloves should be worn. Always wash hands thoroughly following any sample collection and especially before handling any food. The use of hand sanitizing lotion is recommended.
- 2) A properly sized and cleaned sampling bottle must be prepared before going to the site. The bottle, cap and sampling equipment must be sterilized if the sample is to be analyzed for bacteriological activity.
- 3) The effluent sample should be tested at the time of collection for the presence of chlorine. If the testing laboratory needs to analyze chlorinated effluent, the presence of chlorine should be noted on the sample bottle. Prior to analysis, only sufficient dechlorination agent should be added to reach the chlorination endpoint. In past practice, many laboratories used prepared sample bottles with a dechlorination agent already present in the bottle. It has since been discovered that if the amount of dechlorination agent exceeds the chlorine demand in the effluent, false positive BOD<sub>5</sub> and CBOD<sub>5</sub> readings can result.
- 4) For the parameters that require collection of a grab sample, several considerations must be followed:
  - a) The location of sample collection is extremely important. A grab sample must be free falling from the end of the effluent pipe or taken at a point where the flow stream is uniform with enough velocity to prevent the deposition of solids in the line. *"Where samples are to be collected from flowing pipes, keep the sample line as short as possible."*<sup>2</sup>
  - b) The effluent pipe in a gravity flow residential treatment system will rarely flow full of effluent. Typically, the effluent flows through only a small section of the bottom of the pipe. The remainder of the pipe above the normal flow line is exposed to all types of environmental factors. Dust, leaves, plant spores, insects and small animals may have access to a partially full effluent pipe. This foreign material can, and routinely does, collect in the pipe during a low flow/no flow period and could be washed into the sample bottle when routine flow is present. For this reason, the interior and exterior of the pipe in the vicinity of the sampling area must be cleaned and sterilized prior to collection of an effluent sample. This will include removal of grass or weeds around the effluent pipe and cleaning the inside and outside of the pipe with soap and water followed by a disinfectant (i.e. bleach or peroxide).
- c) A residential treatment system can be effectively sampled only when there is an effluent flow. Due to intermittent residential flow patterns, there may not be effluent flow at the time designated to collect a grab sample. Hydraulic flow may be induced into the treatment system in order to generate effluent for grab sampling. With detention time designed into any wastewater treatment system, water flow introduced into the system inlet or pretreatment chamber in order to generate effluent, will undergo full treatment before reaching the system outlet. Remember that the effluent grab sample is not representative of the average flow and therefore can not be used to evaluate long term system performance. Also, keep in mind that the induced flow must be typical of the normal incoming flow rate. A surge flow into most wastewater treatment systems will create a washout of solids that can be carried into the sample container. This effect will skew certain test results dramatically.
- d) Once the effluent is free flowing and the prepared sample bottle is in position to collect the effluent, carefully place the mouth of the sample bottle directly into the falling stream of effluent and collect the sample. Be careful not to touch the effluent pipe with the mouth of the sample bottle. Fill the sample bottle nearly to the top. Leave an airspace above the sample liquid of approximately 1% to 5% of the container volume to allow for thermal expansion during shipment.
- 5) Extreme care must be used when handling an open sample bottle to prevent contamination from environmental factors. Airborne dust, insects, blades of grass or any material coming in contact with the sample bottle or cap, other than free falling effluent, will contaminate the sample. Even a properly collected sample can easily become contaminated if the container is allowed to touch the sides of a basin or access riser, or if dirt or other material is allowed to enter the bottle.
- 6) The volume of sample required for proper analysis varies according to the test performed. Refer to the table on page six for sample volume guidelines.
- 7) Minimum sample sizes are recommended by Standard Methods for the Examination of Water and Wastewater, and other sources. However, laboratory experience, familiarity with the treatment system being tested and the number of analyses required for a given effluent may allow collection and submittal of smaller volume samples. The minimum sample size indicated in the table on page six considers only the volume required for an individual parameter. Confer with a local laboratory to establish the volume requirements needed based on the total number of parameters requiring analysis.

## EFFLUENT SAMPLING FOR RESIDENTIAL TREATMENT SYSTEMS (Page 4 of 6)

- 8) Once the sample has been collected, carefully remove the bottle. Be sure not to touch the mouth of the bottle against any other surface. The sample can then be analyzed for field parameters, if required, or capped and stored as necessary.
- 9) The sample bottle containing the grab or composite sample should be carefully labeled to include the following information:
  - a) A unique sample identification number
  - b) The source/location of sample collection (i.e. final effluent, discharge pipe, etc.)
  - c) The date and time the sample was collected
  - d) The name of the technician who collected the effluent sample
  - e) The name of the treatment system owner where the sample was taken
  - f) Whether a grab or composite effluent sample was collected
  - g) The presence or absence of chlorine in the effluent sample
  - h) All parameters requiring analysis, such as CBOD<sub>5</sub>, TSS, etc.
  - i) Listing of any required preservative added (see the table on page six)
  - j) The results of any analysis that needed to be performed onsite
- 10) For parameters not requiring immediate testing, the analysis should be performed as soon as possible, using proper storage and sample preservation during transport. This almost always involves cooling the sample to inhibit further biochemical reactions occurring during transport and storage. Chilling the liquid to the required temperature and maintaining it during all transport and storage time is essential for sample integrity. Icing down the sample is preferred as rapid chilling takes place without expensive mechanical refrigeration equipment, and there is no danger of over-chilling and freezing the sample.
- 11) Invalid data will result if the sample is held for a longer period of time than the guidelines permit. For this reason, travel time, laboratory operating hours, weekend or holiday schedules all need to be considered with any sampling program.
- 12) Sampling for the level of chlorine, coliform bacteria or for the performance of dechlorination equipment requires some special considerations:
  - a) Due to the unstable nature of chlorine, samples collected for this parameter must be analyzed immediately. Storing samples in an open container allows the chlorine to volatilize into free air. Samples stored in a closed container can continue chemical reactions that can change the chlorine into other compounds.
  - b) Samples collected to test for the presence of coliform or other bacteriological examinations must be collected in a sterile bottle and immediately checked for the presence of chlorine. Any chlorine present must be removed or stabilized prior to storage or transport of the sample. Storing a bacteriological sample with chlorine present allows additional "contact time" and may result in a false positive indication of disinfection efficiency. Conversely, stabilizing or removing the chlorine allows the process of bacterial regrowth to begin. Therefore, stabilized samples must be immediately cooled to 4° C and stored for a maximum of 6 hours, before significant bacterial regrowth occurs.
  - c) The point of sample collection is also critical. If a contact chamber is designed for effective bacteriological reduction and is followed by a dechlorination system at the contact tank outlet, bacteria regrowth due to environmental exposure can begin to occur in a long outlet pipe and could be significant in a downstream component, such as a post-aeration chamber. Therefore, samples for bacteriological analysis must be taken at the end of contact time, but upstream of any other treatment or storage process.
- 13) Special precautions and record keeping are required for any samples taken for compliance with an NPDES (National Pollutant Discharge Elimination System) permit or other regulatory requirement. Be sure to have the analysis performed by a laboratory certified for the specific testing required. Analytical data must be logged in the required format and on the form appropriate to the proper agency.
  - a) Where legal action or other serious considerations are dependent on the results of sampling to determine system performance, chain-of-custody procedures to track possession of the sample are required. These procedures usually require a sample bottle to be closed with a tamper-evident seal immediately after collection. A written record on the chain-of-custody form requires each person transporting or handling the sample to certify the specific period of time that the sample is in their possession. The completed form insures that proper handling of the sample has been documented. The chain-of-custody record should remain with the sample during laboratory analysis and be filed with the permanent log of lab results.

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# EFFLUENT SAMPLING FOR RESIDENTIAL TREATMENT SYSTEMS (Page 5 of 6)

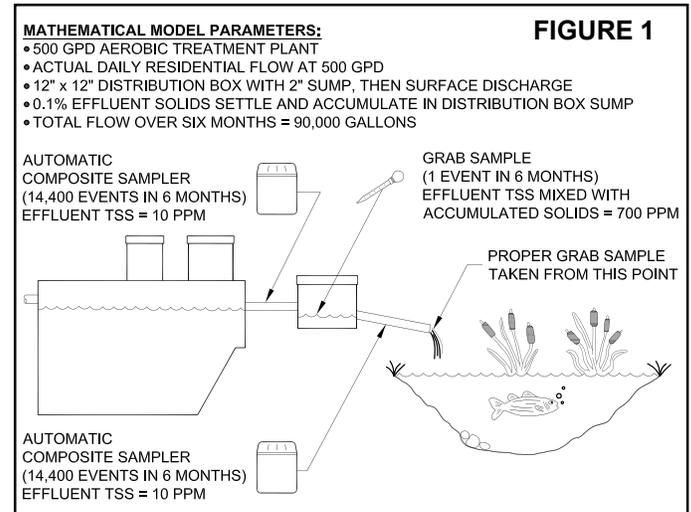
## LOCATION OF SAMPLE SITE

While the limitations of analyzing effluent collected by grab sampling have been discussed, the use of grab samples for evaluation of a residential treatment unit is further compromised if the grab sample is not collected from effluent with sufficient velocity to keep solids in suspension. *“Avoid taking samples at points where solids settling occurs or floating debris is present. These situations occur normally in quiescent areas, where the velocity of the flow has decreased.”*<sup>3</sup> For this reason, under no circumstances should system performance be evaluated by a grab sample of effluent taken from a pump chamber, distribution box or any device that contains a sump. Especially due to the intermittent flow patterns that are typical of individual residences, effluent solids tend to settle out in a sump when allowed enough time and a low velocity. Even the few solids present in a high quality treatment system effluent can settle out in a sump during a no flow period. If only a very few solids settle out in the sump during a no flow period today, they can remain and accumulate with additional solids settling out over successive days. This will result in an amount of solids accumulated in the sump that are a gross misrepresentation of what the treatment system effluent has in suspension during any given flow day.

Using a mathematical model will allow us to put these considerations into perspective (see Figure 1). At 500 GPD, a residential treatment unit will discharge approximately 90,000 gallons of effluent over the six month period between routine service inspections. In our mathematical model, this treatment system is generating a high quality effluent of 10 mg/L CBOD<sub>5</sub> and 10 mg/L TSS. In the flow path of this model, the treatment system effluent passes through a common 12" by 12" distribution box containing a 2" sump below the effluent discharge pipe.

In our mathematical model, we will assume that due to the intermittent flow pattern of a residential treatment unit, 0.1% (0.001) of the total effluent suspended solids will settle out and accumulate while effluent passes through the sump. (While it is likely that a higher percentage of solids will settle out, especially during an overnight period of no flow, we will consider that on the average, only 1 out of each 1,000 effluent solids will settle out in the distribution box. Therefore, 999 out of every 1,000 effluent solids will stay in suspension and are carried out with the flow.) In this model, these parameters will remain in a steady state for six continuous months, corresponding to the period between service visits. After six months of operation, the sump in the bottom of the distribution box has accumulated 1 out of each 1,000 effluent solids that were contained in the 90,000 gallons of high quality effluent that has passed through the distribution box. If the contents of the sump in the bottom of the distribution box are then mixed, collected and analyzed as a grab sample, the data will show an effluent containing more than 700 mg/L of total suspended solids. This obviously erroneous data would seem to indicate that

the effluent contains more suspended solids than typical residential influent flow. In reality, this treatment system is actually discharging an effluent of 10 mg/L total suspended solids. With this model, it is easy to understand that judging treatment system performance by dipping into any effluent sump and stirring the contents (effluent and accumulated solids) is totally invalid.



It is understood that under absolute conditions, some degradation of the accumulated solids will occur during the length of time the solids are retained in the sump. Also, some of the organic material processed in the treatment system is converted into suspended solids, prohibiting an exact solids mass balance to be performed. While it would be scientifically impossible to ascertain the exact degree of bio-degradation or conversion of organic matter, neither process will be of enough significance to affect the conclusion. It is absolutely certain that stirring or mixing the contents of a sump and analyzing this mixture will result in data showing effluent solids that are hundreds, if not thousands, of times greater than data from samples collected by proper composite sampling techniques. These same principals hold true whether the effluent sample is taken directly from a distribution box, a pump chamber, a chlorine contact chamber, a post-aeration chamber, a roadside ditch or any structure that retains effluent below the flow line. Even a small sump, such as a 4" diameter pipe cross capped at the bottom, will accumulate effluent solids over a short period of time. Use of this pipe cross in conjunction with a composite sampler designed for automatic operation will still require the cross to be flushed clean each day. This is usually done when the operator is collecting the daily sample and checking the equipment operation.

When properly performed, effluent sampling is the most important tool available to evaluate treatment system performance, make operational adjustments, protect the environment and insure the health and safety of all. However, the proper techniques for collecting and analyzing any effluent sample must be followed before an accurate, informed conclusion can be made.

# EFFLUENT SAMPLING FOR RESIDENTIAL TREATMENT SYSTEMS (Page 6 of 6)

## GUIDELINES FOR SAMPLE COLLECTION, STORAGE AND ANALYSIS

EFFLUENT PARAMETER	MINIMUM SAMPLE SIZE	SAMPLE TYPE	PRESERVATION REQUIRED	MAXIMUM HOLDING TIME
Carbonaceous 5 Day Biochemical Oxygen Demand (CBOD <sub>5</sub> )	1,000 mL	Composite	Refrigerate, 4°C	6 hrs./48 hrs.*
Total Suspended Solids (TSS)	200 mL	Composite	Refrigerate, 4°C	7 days
pH	50 mL	Grab	Analyze immediately	0.25 hrs.
Dissolved Oxygen	300 mL	Grab	Analyze immediately	0.25 hrs.
Temperature	N/A	Grab	Analyze immediately	0.25 hrs.
Total Residual Chlorine	500 mL	Grab	Analyze immediately	0.25 hrs.
Ammonia Nitrogen	500 mL	Composite	Analyze as soon as possible or add H <sub>2</sub> SO <sub>4</sub> to pH <2, refrigerate	7 days/28 days*
Nitrate Nitrogen	100 mL	Composite	Analyze as soon as possible, refrigerate	48 hrs. (28 days for chlorinated samples)
Total Kjeldahl Nitrogen (TKN)	500 mL	Composite	Add H <sub>2</sub> SO <sub>4</sub> to pH <2, refrigerate	7 days/28 days*
Oil & Grease	1,000 mL	Grab	Add H <sub>2</sub> SO <sub>4</sub> to pH <2, refrigerate	28 days
Total Phosphorus	100 mL	Composite	Add H <sub>2</sub> SO <sub>4</sub> to pH <2, refrigerate	28 days
Fecal Coliform	N/A	Grab	Add 0.008% Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> **, cool to 4°C. All collection utensils and techniques must be sterile	6 hrs.

\*First value is maximum storage time recommended by "Standard Methods." Second value is maximum holding time allowed by Code of Federal Regulations<sup>4</sup>, but the code also indicates that samples should be analyzed as soon as possible after collection. In any case, the second value listed is the maximum time that samples may be held prior to analysis and still be considered valid.

\*\*Should only be used in the presence of residual chlorine.

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# COMMERCIAL, MUNICIPAL, INDUSTRIAL AND RESIDENTIAL FLOW EQUALIZATION FOR WASTEWATER TREATMENT SYSTEMS

In the past 50 years many advances have been made in the nature and extent of pollution control through the use of improved commercial, municipal, industrial and residential wastewater treatment facilities. Each new refinement and process, while improving overall treatment efficiency, has been hampered by the widely varying nature of wastewater types, strengths and fluctuations in volume. Just in the last 25 years, serious efforts have been undertaken to develop new systems, equipment and components designed to reduce or eliminate the negative effects of volume and strength variations in wastewater. These effects have led to the development and widespread use of flow equalization equipment.

Flow equalization is the process of controlling hydraulic velocity, or flow rate, through a wastewater treatment system. The equalization of flow prevents short term, high volumes of incoming flow, called surges, from forcing solids and organic material out of the treatment process. Flow equalization also controls the flow through each stage of the treatment system, allowing adequate time for the physical, biological and chemical processes to take place.

Published in 1974, the USEPA TECHNOLOGY TRANSFER REPORT states *"The cyclic nature of wastewater flows in terms of volume and strength is well recognized."* It goes on to say *"improved efficiency, reliability and control are possible when physical, biological and chemical processes are operated at or near uniform conditions. For this reason, flow equalization is employed."* Since the mid-1970's, flow equalization has been widely used for commercial, municipal and industrial wastewater treatment systems, both in the design of new facilities and also to modernize and upgrade existing systems.

This technology has only recently begun to be used in residential treatment systems. The flow patterns of residential treatment systems are intermittent and variable in nature, generating frequent hydraulic and organic surges. These surges can result in large quantities of solids being washed out of the system. The SEPTIC SYSTEM OWNER'S GUIDE, published in 1999 by the University of Minnesota Extension Service, states *"for complete and uniform treatment of wastes, the system needs time to work. The ideal situation would be to have wastewater enter the system as evenly as possible throughout the day and week."* The GUIDE continues to explain that when a surge occurs *"suspended solids are carried into the soil treatment system, clogging soil pores and preventing adequate treatment."* In 1970, the National Sanitation Foundation developed a model of daily residential flow patterns for use in testing onsite treatment systems. This model flow pattern, which is still in use today, consists of three periods of concentrated flow, alternating with varied periods of no flow.

This pattern was purposely structured to reflect the most severe flow rate fluctuations that are typical of individual residences. In 1982, a separate test procedure was completed to include stress sequences. These stresses consisted of prolonged no flow periods combined with surge flows several times the daily loading rate. In 1990, the stress sequences were incorporated into the residential flow pattern to reflect the less frequent but more harmful variations in flow that systems may very well experience. A residential treatment system that can reduce these surges and properly process the wastewater will consistently have higher quality effluent and longer operational life.

When flow equalization is incorporated into a wastewater treatment system, numerous benefits are produced:

1. In the case of a septic tank or pretreatment tank, gravity separation of solids is greatly enhanced. This prevents short-circuiting and eliminates excess solids from being carried downstream into the secondary treatment facility or disposal system.
2. When a secondary biological or chemical treatment system is used, elimination of hydraulic surges guarantees adequate process retention time and a much higher degree of treatment.
3. Clarifiers following secondary treatment will have greater solids separation and improved effluent quality. If an internal filtration device is used, solids loading to the filtration device will be reduced, resulting in longer filter life and higher effluent quality.
4. The operation of a downstream sand filter, media filter or constructed wetland is enhanced by more consistent loading, the equalization of surge flows and the removal of excess solids.
5. All types of effluent disposal systems, including tile fields, mounds, irrigation systems, etc., will operate longer and more efficiently because organic and hydraulic surges are eliminated and system overloading is prevented.

## FLOW EQUALIZATION FOR WASTEWATER TREATMENT SYSTEMS (Cont.)

Norweco's patented Bio-Kinetic System incorporates non-mechanical flow equalization, effluent filtration, settling, solids storage and chemical addition in one easily installed assembly that is serviceable from grade. The system provides flow equalization for wastewater treatment systems without the use of pumps or holding tanks, with no moving parts and no electricity required. This is accomplished by storing incoming flow surges in the upstream treatment tank. Six flow control ports in the Bio-Kinetic System meter the stored liquid through all treatment processes at a controlled rate. In a typical septic system, daily residential flow is equalized an average of more than 50% when a Bio-Kinetic System is used. This revolutionary device is an integral component of the Singulair Wastewater Treatment Plant. In addition, the Bio-Kinetic System can be easily incorporated into any onsite treatment and disposal process through the use of a Bio-Kinetic Wastewater Management System.

### EFFECTS OF FLOW EQUALIZATION ON TREATMENT PROCESSES UTILIZING TYPICAL HYDRAULIC LOADING PATTERNS WITH A BIO-KINETIC SYSTEM

TREATMENT COMPONENT	RATED CAPACITY (GPD)	ACTUAL HOLDING CAPACITY	AVG PROCESS FLOWRATE WITHOUT FLOW EQUALIZATION	AVG PROCESS FLOWRATE WITH FLOW EQUALIZATION	AVG EQUALIZATION PERCENT	AVG DETENTION TIME WITHOUT FLOW EQUALIZATION	AVG DETENTION TIME WITH FLOW EQUALIZATION	AVG INCREASE IN COMPONENT DETENTION TIME PERCENT
SEPTIC TANK	500	1,500 gallons	0.926 GPM	0.457 GPM	50.6%	27.0 HRS	54.7 HRS	102%
SEPTIC TANK	1,000	2,500 gallons	1.852 GPM	0.814 GPM	56.0%	22.5 HRS	51.2 HRS	127%
SEPTIC TANK	1,500	4,000 gallons	2.778 GPM	1.158 GPM	58.3%	24.0 HRS	57.6 HRS	140%
SEPTIC TANK	2,000	5,000 gallons	3.704 GPM	1.468 GPM	60.3%	22.5 HRS	56.8 HRS	152%
DOWNSTREAM TILE FIELD (typical)	500	500 lineal feet	0.926 GPM	0.457 GPM	50.6%	5.9 HRS (theoretical)	11.9 HRS (theoretical)	102%
DOWNSTREAM MOUND (typical)	500	50 lineal feet	0.926 GPM	0.457 GPM	50.6%	0.6 HRS (theoretical)	1.2 HRS (theoretical)	100%
DOWNSTREAM SUBSURFACE SAND FILTER	1,000	870 square feet	1.852 GPM	0.814 GPM	56.0%	234.2 HRS (theoretical)	533.0 HRS (theoretical)	127%
DOWNSTREAM SURFACE SAND FILTER	1,500	60 square feet	2.778 GPM	1.158 GPM	58.3%	8.1 HRS (theoretical)	19.4 HRS (theoretical)	139%
AEROBIC SYSTEM	600	1,300 gallons	1.111 GPM	0.553 GPM	50.2%	19.5 HRS	39.2 HRS	101%
AEROBIC SYSTEM	1,000	2,200 gallons	1.852 GPM	0.767 GPM	58.6%	19.8 HRS	47.8 HRS	141%
AEROBIC SYSTEM	1,500	2,400 gallons	2.778 GPM	1.125 GPM	59.5%	14.4 HRS	35.5 HRS	146%
AEROBIC SYSTEM	2,000	4,300 gallons	3.704 GPM	1.399 GPM	62.2%	19.3 HRS	51.2 HRS	165%
AEROBIC SYSTEM PRETREATMENT	600	450 gallons	1.111 GPM	0.553 GPM	50.2%	6.7 HRS	13.5 HRS	101%
AEROBIC SYSTEM AERATION	600	600 gallons	1.111 GPM	0.553 GPM	50.2%	9.0 HRS	18.1 HRS	101%
AEROBIC SYSTEM CLARIFICATION	600	250 gallons	1.111 GPM	0.553 GPM	50.2%	3.7 HRS	7.5 HRS	103%
DOWNSTREAM CHLORINE CONTACT	600	50 gallons	1.111 GPM	0.553 GPM	50.2%	0.7 HRS	1.5 HRS	114%
DOWNSTREAM CHLORINE CONTACT	1,000	100 gallons	1.852 GPM	0.767 GPM	58.6%	0.9 HRS	2.2 HRS	144%
DOWNSTREAM CHLORINE CONTACT	1,500	150 gallons	2.778 GPM	1.125 GPM	59.5%	0.9 HRS	2.2 HRS	144%

The above chart clearly demonstrates the important role flow equalization plays in wastewater treatment. Incorporating flow equalization into residential onsite treatment systems makes any system perform better and prevents premature failure. Hydraulic surges are produced in the home every day through the combined use of bathtubs, dishwashers, disposals, clothes washers, shower facilities and a variety of other water using appliances. When these surges occur, a residential treatment system without flow equalization is compromised and often will not provide adequate treatment. Flow equalization allows commercial, municipal, industrial and residential wastewater systems to deliver the treatment they were designed to provide.

**PROGRESS THROUGH**

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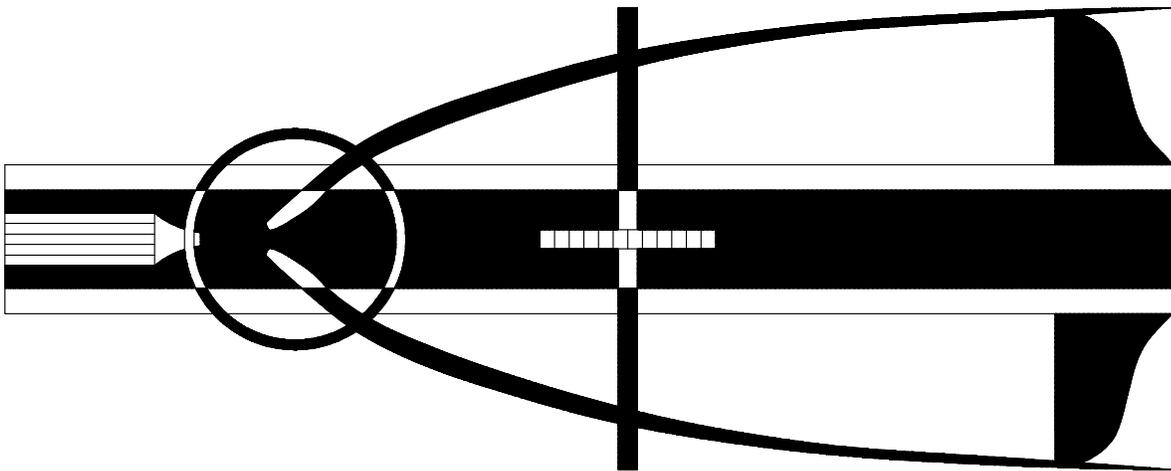
**SERVICE SINCE 1906**

# BIO-KINETIC®

## WASTEWATER MANAGEMENT SYSTEM MODEL BK 2000

### GENERAL SPECIFICATIONS

The contractor shall furnish and install one complete Bio-Kinetic wastewater management system with Bio-Kinetic tertiary device, including all applicable equipment, as described in the following specifications. All domestic wastewater shall pass through the Bio-Kinetic wastewater management system for advanced treatment prior to being returned to the environment. Settling and storage of suspended solids, flow equalization, filtration and chemical addition shall be accomplished for the wastewater treatment facility by the Bio-Kinetic wastewater management system. The advanced treatment system shall be a Bio-Kinetic Model BK 2000 wastewater management system, as manufactured by Norweco, Inc., Norwalk, Ohio, USA. The wastewater management system shall be serviceable from grade and shall include a solids settling and retention basin, Bio-Kinetic tertiary device, anti-shear inlet and outlet couplings, safety/service guard, lockable access cover, compression clamp, system mounting casting and extension risers as required.



### OPERATING CONDITIONS

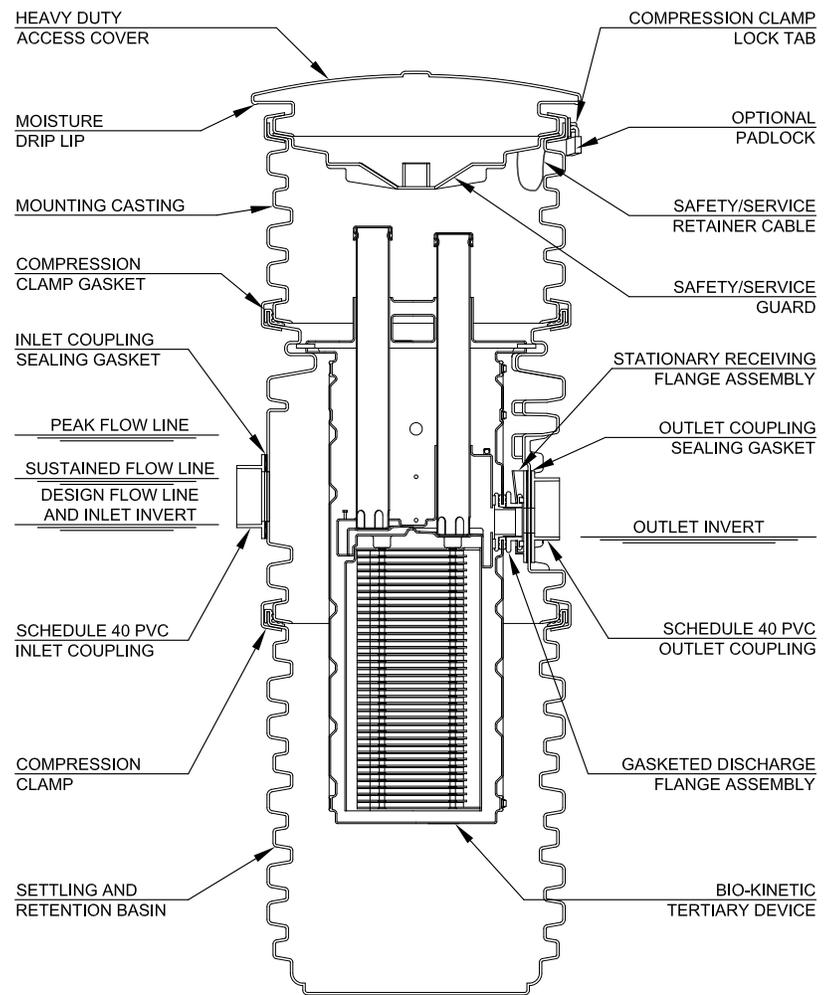
The Bio-Kinetic wastewater management system shall be an integral part of the overall wastewater treatment and disposal facility. The system shall be rated to accommodate domestic wastewater flows up to 2,000 gallons per day when used downstream of a properly sized treatment facility. Total holding capacity of the wastewater treatment facility shall provide a minimum of 24 hour retention of the average design daily flow. Design of the wastewater treatment facility, including primary/secondary treatment and wastewater management system, shall insure reliable, long term performance without upset even when the significant runoff period is six hours. Hydraulic design considerations of the treatment facility and wastewater management system shall be such that intermittent peak flow factors as high as four shall not upset hydraulic reliability within the facility. Use of the Bio-Kinetic wastewater management system, when installed by an authorized agent, shall be approved by the local governing regulatory agency.

SPECIFICATIONS

# BIO-KINETIC®

## SETTLING AND RETENTION BASIN

The settling and retention basin shall be designed to remove biosolids from domestic wastewater. Total holding capacity of the retention basin below the outlet invert shall be 52 gallons. For special applications, additional ring sections are available to increase the liquid and solids retention capacity. The retention basin shall be manufactured to be watertight at burial depths of up to 12 feet. The inlet and outlet couplings of the basin shall contain 4" diameter Schedule 40 PVC pipe couplings to permit a solvent weld connection of inlet and discharge piping. Fall through the retention basin and internal components from inlet invert to outlet invert shall be a total of one inch. A system mounting casting to allow access to the retention basin, Bio-Kinetic tertiary device and all internal components shall be provided. The mounting casting shall be equipped with a molded, one-piece, heavy duty, ribbed, removable access cover with moisture drip lip. The access cover shall be securely installed such that the moisture drip lip is 3" above finished grade. The cover shall be secured to the retention basin by an injection molded compression clamp with lock tab to prevent unauthorized access. The retention basin shall be equipped with a safety/service guard. The safety/service guard shall be installed below the retention basin cover and securely connected to the mounting casting by a retainer cable. The internal safety/service guard shall be designed to prevent accidental entry and be supported by the uppermost internal rib of the mounting casting. To prevent loss or theft, the safety/service guard shall be permanently connected to the retention basin by stainless steel cable. The retention basin, optional ring sections, safety/service guard, access cover and system mounting casting shall be constructed of corrosion resistant, UV stabilized polyethylene. All joints within the retention basin shall be sealed with a polyisoprene gasket and injection molded compression clamp secured with bolted lock tab. The retention basin shall be an integrally molded, heavy duty, one-piece unit, with only one clamp required to attach the access cover. For deeper installations, additional clamps shall be used to connect ring sections and extension risers to the retention basin. Where special shipping considerations apply, the retention basin may be shipped in individual sections for field assembly with compression clamp.



BK 2000 SYSTEM

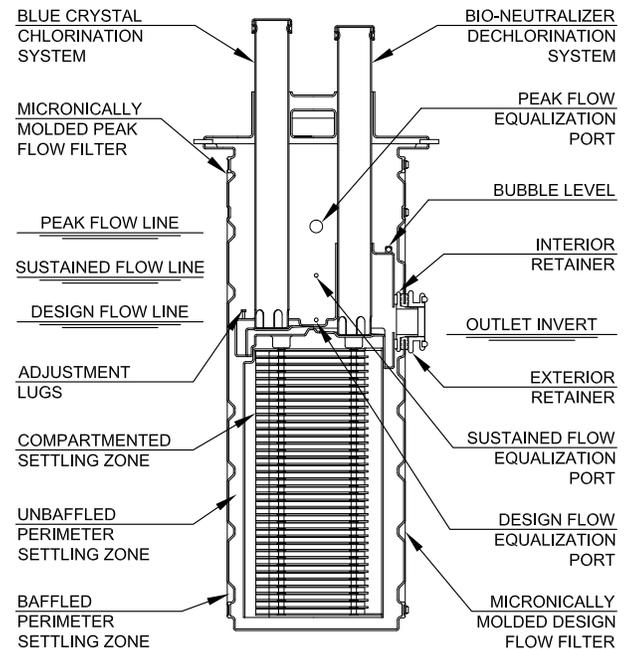
## EXTENSION RISERS

For installations where the inlet invert of the retention basin is more than 28" below finished grade, optional extension risers shall be installed. Extension risers shall be constructed of the same material as the retention basin, optional ring sections and mounting casting. To permit maximum installation flexibility and to accommodate various treatment system elevations, individual extension risers shall be available in 6" increments from 6" up to 72" in height. When an extension riser is used, the internal safety/service guard shall be mounted in the uppermost rib of the riser, directly below the access cover. Extension risers shall be connected to the mounting casting and sealed with a polyisoprene gasket and injection molded compression clamp.

# MODEL BK 2000

## BIO-KINETIC® TERTIARY DEVICE

A Bio-Kinetic tertiary device shall be connected to the outlet coupling within each retention basin. Suspended and settleable solids and BOD shall be removed from the wastewater flow and retained within the basin and/or the three separate filtration zones and eight independent settling zones of the Bio-Kinetic tertiary device. Each Bio-Kinetic tertiary device shall provide non-mechanical flow equalization through all gravity flow treatment processes of the upstream and downstream wastewater facility, including (as applicable) pretreatment, anaerobic treatment, aerobic treatment, clarification, filtration, chlorination, dechlorination and surface or subsurface effluent disposal systems. The Bio-Kinetic device shall be supplied with locking lugs and removable moisture/vapor shield and shall consist of a design flow and peak flow micronically molded filter, baffled perimeter settling zone, non-mechanical flow equalization, flow distribution deck, lifting handles, level indicator, adjustment lugs, chlorination feed tube, unbaffled perimeter settling zone, solids contact zone, vertical inlet zone, compartmented settling zone consisting of forty-two baffled chamber plates, effluent stilling well, final discharge zone, adjustable outlet weir, dechlorination feed tube, outlet zone and gasketed discharge flange. All components shall be manufactured from inert synthetic materials or rubber, assembled in circular fashion and connected to a PVC outlet coupling. The outlet coupling shall permit a solvent weld connection to the discharge piping. Each Bio-Kinetic device shall be installed such that the inverts of the design flow equalization ports are located at the normal liquid level of the gravity flow treatment facility. If intermittent flow rates exceed the capacity of the design flow ports, flow shall be held upstream until the intermittent flow dissipates or continues to increase. If the intermittent flow continues to increase, it will reach the pair of sustained flow equalization ports. With four ports in use, flow through the system increases while the Bio-Kinetic device continues to provide non-mechanical flow equalization to all upstream and downstream processes. Two peak flow equalization ports shall be supplied to equalize intermittent periods of peak hydraulic loading. Blue Crystal tablet chlorination system and Bio-Neutralizer tablet dechlorination system feed tubes shall be positioned such that the flow-activated chemical cannot make contact with the liquid upstream of the feed tubes. Treatment systems utilizing only slotted or screen filtration do not provide non-mechanical flow equalization throughout all gravity flow processes or chemical addition and shall not be considered for this application.



**BIO-KINETIC TERTIARY DEVICE**

## NON-MECHANICAL FLOW EQUALIZATION

The Bio-Kinetic device shall provide non-mechanical, demand use, flow equalization to the entire gravity flow wastewater treatment facility. Flow equalization shall control normal residential flow rates and reduce typical residential flow surges (e.g. shower @ 10 minutes duration, bathtub discharge @ 5 minutes duration, clothes washer discharge @ 2 minutes duration, and dishwasher discharge @ 2 minutes duration). The flow equalization rate shall be dependent upon the hydraulic loading pattern, the duration of flow surges and the size of the treatment facility tankage. In order to fully utilize the upstream flow equalization capacity, the transfer pipe connecting the upstream facility to the Bio-Kinetic wastewater management system shall be not longer than 10 feet and shall fall no more than 1/4" over the entire length. The transfer pipe may be installed at greater length and/or with more fall, but shall result in decreased flow equalization rates that are dependent upon overall pipe length and total fall. At a 2,000 gallon per day residential loading pattern, minimum performance of the device shall equalize daily flow more than 60% when used with a treatment facility having at least 80 square feet of upstream liquid surface area. Flow equalization shall increase detention time of the wastewater in all treatment processes and shall prevent hydraulic upset and solids washout. Flow equalization shall result in additional solids being retained in the upstream portion of the treatment facility, insuring fewer and more stabilized solids in the effluent. Remaining solids shall be further reduced by the Bio-Kinetic wastewater management system. Reduced hydraulic and organic loading shall result in increased treatment and disposal system life.

## **BLUE CRYSTAL® CHLORINATION SYSTEM**

The BK 2000 shall be equipped with a supply of Blue Crystal residential disinfecting tablets installed in the chlorine feed tube of the wastewater management system. Blue Crystal tablets shall be specifically formulated for consistent chlorine dosage to the sustained, variable and intermittent flows that are typical of domestic wastewater treatment systems. The tablets shall be manufactured from pure calcium hypochlorite and shall contain a minimum of 70% available chlorine. The tablets shall incorporate beveled edges to enhance the chemical dissolution pattern. Each tablet within the feed tube shall be 2<sup>5</sup>/<sub>8</sub>" diameter, compressed to a 1" thickness, weigh approximately 5 ounces and be white in color with blue crystals for easy identification. The tablets shall dissolve in direct proportion to the flow rate, releasing controlled amounts of chlorine.

## **BIO-NEUTRALIZER® DECHLORINATION SYSTEM**

The BK 2000 shall be equipped with a supply of Bio-Neutralizer dechlorination tablets installed in the dechlorination feed tube of the wastewater management system. The active ingredients of the dechlorination tablets shall be specifically formulated to chemically neutralize both free and combined chlorine. The tablets shall incorporate beveled edges to enhance the chemical dissolution pattern. Each tablet within the feed tube shall be 2<sup>5</sup>/<sub>8</sub>" diameter, compressed to a 1<sup>3</sup>/<sub>16</sub>" thickness, weigh approximately 5 ounces and be green in color for easy identification. The tablets shall dissolve in direct proportion to the flow rate, releasing controlled amounts of chemical for the instantaneous removal of residual chlorine.

## **TEN YEAR LIMITED WARRANTY**

The manufacturer shall provide a limited warranty against defects in material and workmanship under normal use and service for a period of ten years. The limited warranty shall cover all components of the Bio-Kinetic wastewater management system purchased from the manufacturer, including retention basin, ring sections, safety/service guard, access cover, system mounting casting, extension risers and Bio-Kinetic tertiary device. A detailed copy of the warranty shall be provided to the regulatory agency, contractor and customer as required.

## **EQUIPMENT MANUFACTURER**

The equipment specified herein shall be the product of a manufacturer having a minimum of seven years experience in the construction of prefabricated wastewater treatment equipment and systems. Bids shall be prepared on the basis of the equipment and material specified herein for purposes of determining the low bid. This is not done, however, to eliminate other products of equal quality and efficiency. If equipment is to be substituted, approval of such substitution must be made prior to the execution of any order. It is assumed that substitution will result in a reduction of cost to the contractor and that if accepted, these savings will be passed along by a reduction in the base bid.

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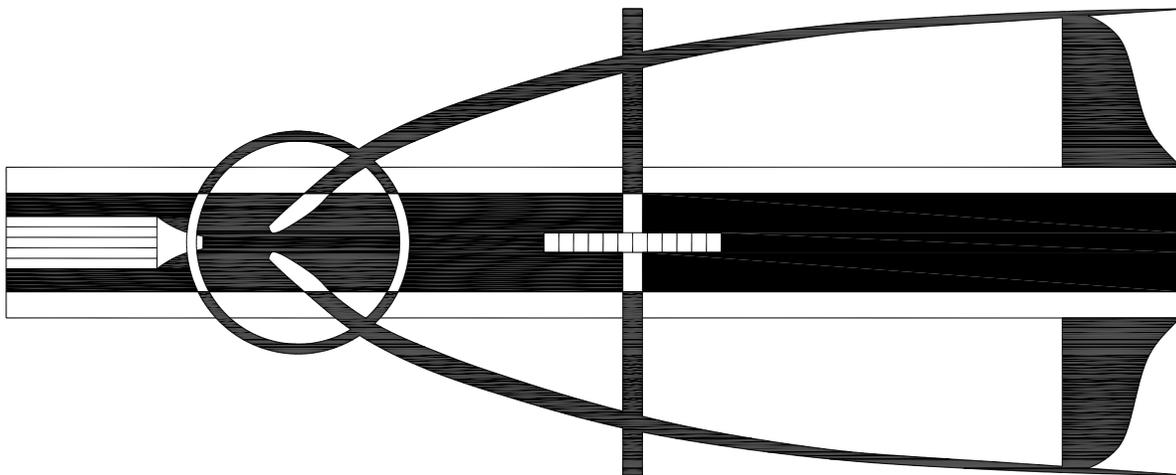
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# ***norweco***<sup>®</sup> **BIO-DYNAMIC**<sup>®</sup> **TABLET FEEDER**

## **GENERAL SPECIFICATIONS**

The contractor shall furnish and install one Bio-Dynamic tablet feeder with all applicable equipment as described in the following specifications. It shall be a flow rated proportional feeder that allows for long-term unattended operation while providing a stable, adjustable chemical dose. Treatment of the water or wastewater flow shall be accomplished by immersion of feed tubes containing vertically stacked chemical tablets. Chemical agents shall be released as the liquid erodes the tablets. The tablet feeder shall be equipped with a self-draining flow channel to allow complete dry down of the chemical tablets during low and/or no flow conditions and to insure long-term tablet integrity.

Principal items of equipment and components of the tablet feeder shall include an integral one-piece molded inlet hub, inlet baffle, tiered flow deck including inert drainage tier, intermediate flow tier and upper flow tier, stationary feed tube insert, feed tubes (2 or 4), outlet weir with optional sluice, hydrodynamic mixing chamber and integral one-piece molded outlet hub. Liquid or gaseous systems requiring extensive handling and safety procedures or dry chemical feeders requiring separate drop boxes, or manholes for in-line mounting shall not be considered for this application.



## **EQUIPMENT MANUFACTURER**

The equipment specified herein shall be the product of a manufacturer having a minimum of seven years experience in the construction of water and/or wastewater treatment systems and equipment. Bids shall be prepared on the basis of the equipment and material specified herein for purposes of determining the low bid. This is not done, however, to eliminate other products or equipment of equal quality and efficiency. If equipment is to be substituted, approval of such substitution must be made prior to execution of any order. It is assumed that substitution will result in a reduction of cost to the contractor and that if accepted, these savings will be passed along by a reduction in the base bid.

**SPECIFICATIONS**

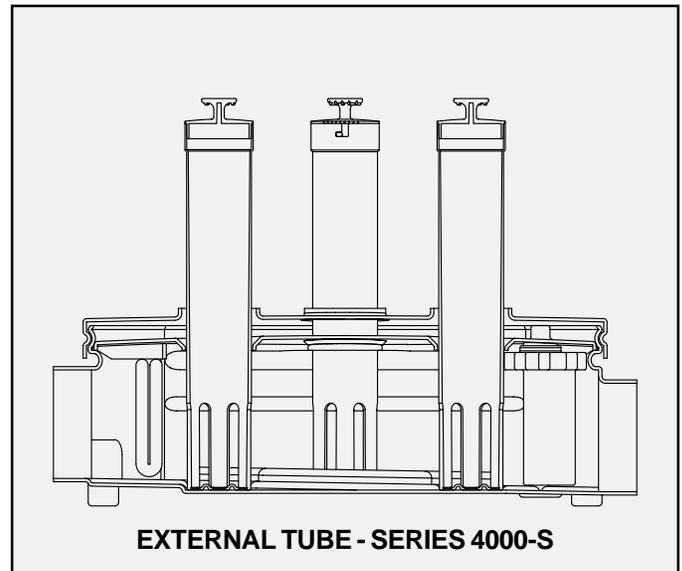
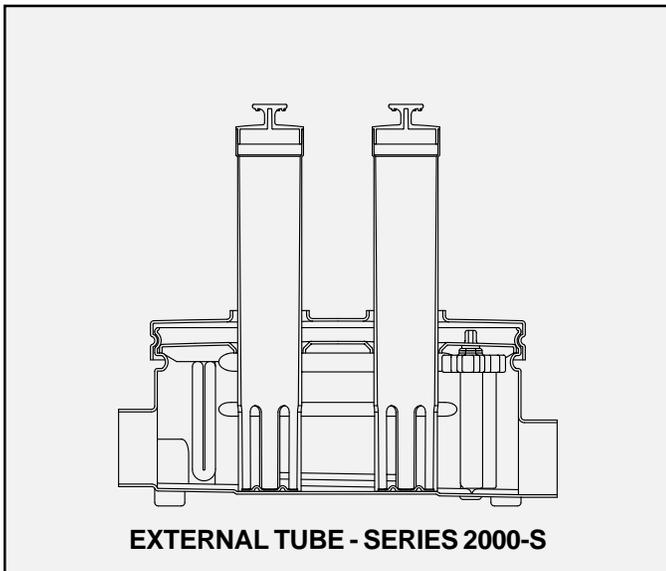
# BIO-DYNAMIC®

## CONSTRUCTION AND OPERATING CONDITIONS

The Bio-Dynamic tablet feeder shall be constructed of heavy duty, UV rated, rotationally molded polyethylene for maximum strength and durability. The feeder shall be a complete dry chemical dosing system that allows dosage capability ranging from 1 to 50 mg/L, according to the operational flow rating (GPD) of the system. A peak flow factor of four shall be used for non-flow equalized wastewater applications to insure proper dosage. The tablet feeder shall be elliptical in shape to utilize the velocity and energy of the liquid for consistent chemical application. The system shall be supplied as a self-enclosed unit suitable for direct burial without the need for a secondary manhole or enclosure.

The integral one-piece molded inlet and outlet hubs shall allow direct in-line connection to standard treatment system piping without the need for special adapters or mounting fixtures. Four reinforced mounting feet shall be molded into the body of the tablet feeder to allow the unit to be directly bolted to tankage or mounting brackets. All feeders shall be equipped with molded in place trim lines located at six inch vertical increments. The trim lines shall accommodate installation of the feeder and risers at the proper operational depth and yet allow field adjustment of the lid location to accommodate landscaping or other functional considerations.

Each translucent ClearCheck feed tube shall contain a vertical stack of tablets which dispense chemical agents into the liquid flow as the tablets are eroded. The chemical feed tubes shall be secured by retaining rings molded into the bottom of the flow deck and with a stationary insert. The retaining rings and stationary insert shall be designed to eliminate the possibility of tube displacement during high flow periods. Direct burial systems utilizing one or more 24" riser assembly shall include extension handles permanently installed on each feed tube. The tablet feeder shall be designed with an internal slope for self-drainage during low and/or no flow conditions to allow complete dry down of chemical tablets. Fall through the tablet feeder from inlet to outlet shall be one inch.



## INLET HUB AND BAFFLE

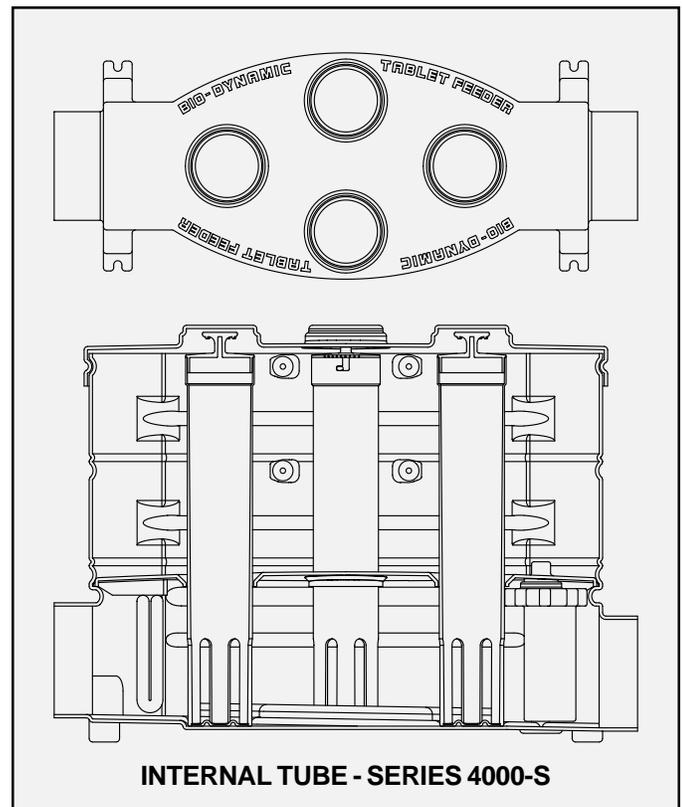
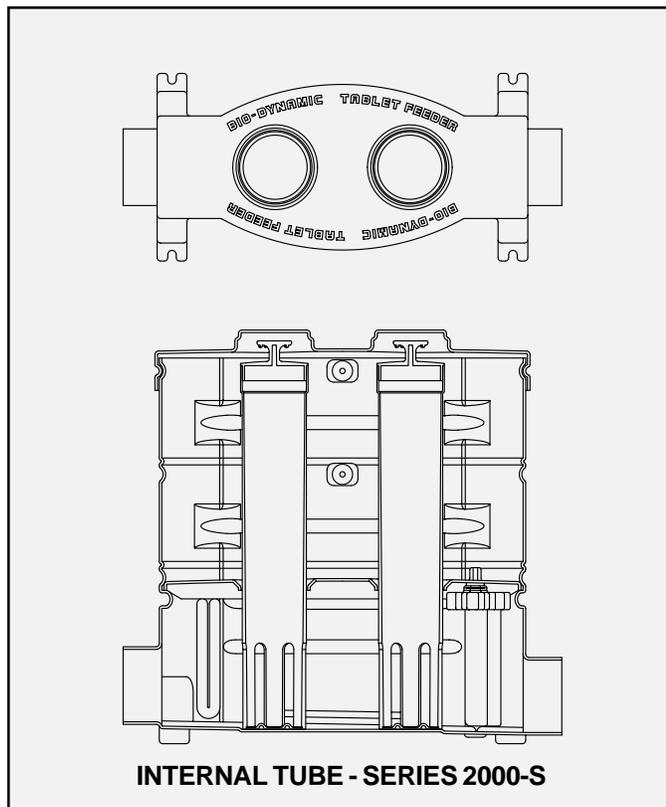
All flow entering the tablet feeder shall pass through the integral one-piece molded inlet hub and be channeled under an adjustable inlet baffle. The molded inlet hub shall allow direct acceptance of (4" or 6") Schedule 40 PVC piping. The inlet baffle shall be located so that the bottom of the baffle is positioned below the mean liquid level. The baffle shall be configured to minimize the effect of periodic flow surges and optimize the dissolution pattern of the chemical tablets. It shall be held in place by molded slots in the feeder sidewall. The baffle shall maintain chemical dosage during low flow periods, while regulating chemical dosage during high flow periods.

## FLOW DECK

The feeder shall contain a multi-tiered flow deck molded into the bottom of the system and configured to control liquid velocity within the unit. The configuration shall result in a stable chemical dose throughout the operating range of the unit and eliminate the potential for tablet degradation. The flow deck shall consist of three separate tiers designed to optimize the intrinsic energy of the liquid. The lowest tier functions as the inert drainage tier and shall encompass all chemical feed tubes and traverse the length of the feeder. This tier shall be employed during extremely low or no flow conditions to form a drainage channel for inert particles and eliminate tablet swelling. Feed tube retaining rings shall be molded into the inert drainage tier and shall securely locate each feed tube in position. When the flow rate increases up to three gallons per minute, the liquid level shall rise to the intermediate tier. This tier is hyperbolic in shape and traverses the length of the feeder. The intermediate channel shall increase flow velocity to insure accurate and consistent chemical delivery and to reduce or eliminate tablet wicking. At flow rates greater than three gallons per minute, the liquid level shall rise to the upper tier of the unit. This tier shall result in uniform flow velocity and provide adjustable tablet dissolution and consistent chemical dosage throughout the anticipated operating range.

## STATIONARY INSERT

Retaining ribs shall be molded into the system housing to support a stationary insert. The insert shall be installed above the solids drainage tier of the tablet feeder and traverse the area of the flow deck. Feed tubes and internal components shall be held in proper position by the insert. Tapered locating holes shall be incorporated into the insert for ease of feed tube installation and removal. For direct burial applications, drill points shall be provided in the feeder body and the stationary insert shall be permanently affixed to the feeder body with synthetic drive rivets.



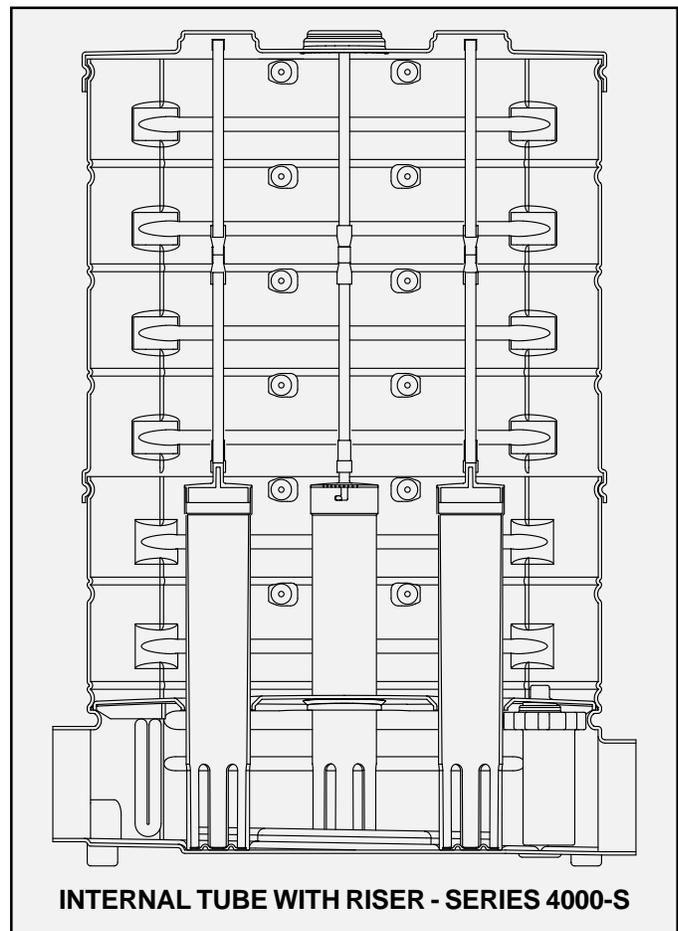
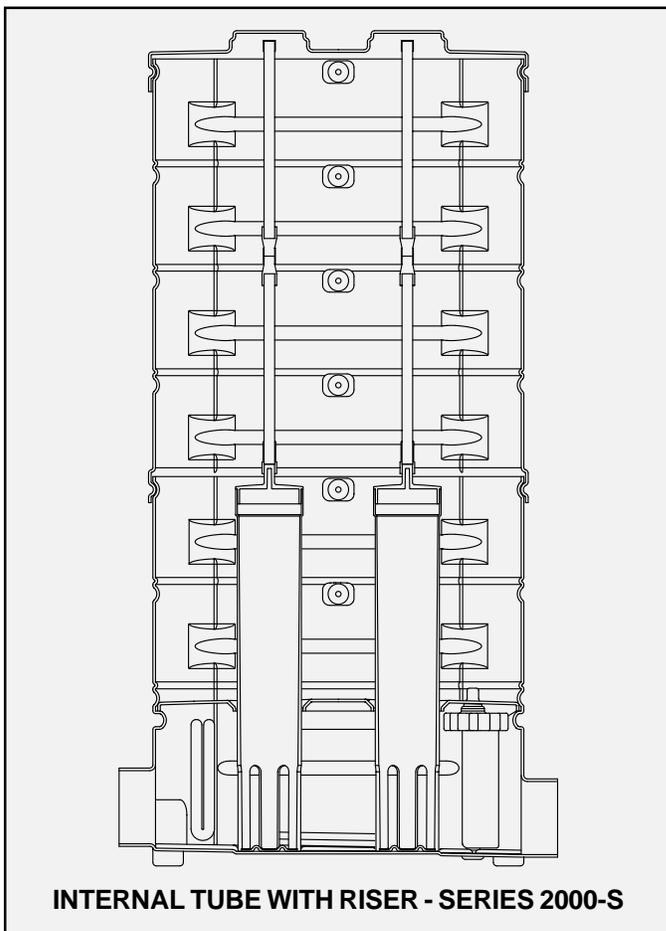
## CHEMICAL FEED TUBES

The tablet feeder shall be equipped with one-piece translucent ClearCheck feed tubes. Each feed tube shall be equipped with a twist lock cap for safety. Notches molded into the feed tube body shall prevent accidental cap removal. The feed tubes shall utilize tablets with the nominal weight and dimensions of 5 ounces,  $2\frac{5}{8}$ " diameter and  $\frac{13}{16}$ " height. The bottom of each feed tube shall be integrally molded with the tube body and contain two drainage ribs to allow the flow stream to purge inert particles and accomplish dry down of chemical tablets during no flow periods. The liquid shall flow through six equally spaced openings in each feed tube for contact with the chemical tablets.

# TABLET FEEDER

## ADJUSTABLE OUTLET SLUICE

The tablet feeder shall be equipped with an optional adjustable outlet sluice to allow regulation of the liquid static head within the unit and provide precise control over chemical dosage. The adjustable outlet sluice shall provide a one inch to three inch adjustable outlet width. Sluice operation shall permit precise adjustment of the chemical dosage throughout the operating range. Adjustment shall be made by rotating the molded plastic hex nut located at the top of each outlet sluice. The hex nut shall protrude through the stationary insert to allow for adjustment from grade with a standard socket. The right and left sections of the adjustable outlet sluice shall be synchronized by integrally molded gears. Each gear segment shall include adjustment limits to insure that the sluice will operate within the desired design range. Each adjustable sluice shall include a top mounted opening indicator. The indicator will provide the operator with a visual indication of the sluice position and the engraved scale on the stationary insert shall indicate the sluice opening in inches. To provide operational flexibility, the adjustable outlet sluice should always be used when an access riser is installed.



## FIXED WEIR

The tablet feeder shall have a fixed weir with interchangeable 1", 2" and 3" plates. The weir plates shall induce a static head within the feeder which regulates the quantity of tablets exposed to the liquid. The fixed weir plates shall be secured by molded slots located within the feeder that allow plates to be removed and exchanged without the need to take the system off-line or the need to make contact with the liquid stream. The molded slots facilitate interchangeability of weir plates and eliminate the need for adhesives or external fasteners. Alternating the fixed weir plates shall allow adjustment of the chemical feed dose in three separate 20% fixed adjustment increments.

# SPECIFICATIONS

## HYDRODYNAMIC MIXING CHAMBER AND OUTLET HUB

The tablet feeder shall be designed with a hydrodynamic mixing chamber downstream of the outlet weir to induce a turbulent flow prior to discharge. The hydrodynamic mixing chamber shall use the induced turbulence of the outlet weir or sluice to provide thorough mixing of the chemical. The chamber is designed to hydrodynamically eliminate the laminar flow induced upstream by the multi-tiered flow deck and prevent flow from short circuiting the treatment process. The integral one-piece molded outlet hub shall directly accept (4" or 6") Schedule 40 PVC piping. Systems that require separate drop boxes or outlet adapters increase installation costs and shall not be considered for this application.

## ACCESS RISERS

To provide maximum installation flexibility and eliminate the need for confined space entry equipment, optional riser assemblies shall be provided. Adjustable access risers will allow direct burial of the tablet feeder and will accommodate direct connection to existing system piping. Each riser shall be molded polyethylene with a nominal height of 24" and adjustable in 6" vertical increments via trim lines molded into each riser section. Risers shall utilize the same molded cover as the tablet feeder body. Each riser section shall contain transverse reinforcing struts and synthetic drive rivets at each joint to allow for direct burial. The reinforcing struts shall be constructed of fiberglass reinforced plastic with a 1" outside diameter and molded nylon couplings on each end. Each strut shall be held in position by an integrally molded retaining boss. Molded drill points shall be provided to locate the drive rivets in the riser assembly. One tube of Bio-Dynamic sealant shall be supplied with each riser section and shall be used to seal each riser joint internally and externally to insure watertight integrity.

## BIO-DYNAMIC® TABLET FEEDER DATA CHART

Model	Inlet/Outlet Diameter	Minimum Flow (GPD)	Design Flow (GPD)	Maximum Flow (GPD)	Number of Tubes	Fixed Weir	Adjustable Sluice	Drawing Number
XT 2000 (S)	4"	200	20,000	100,000	2	Standard	Optional	PC-5-9501
IT 2000 (S)	4"	200	20,000	100,000	2	Standard	Optional	PC-5-9500
ITR 2000-S	4"	200	20,000	100,000	2	Not Available	Standard	PC-5-9502
XT 4000 (S)	6"	20,000	50,000	200,000	4	Standard	Optional	PC-5-9503
IT 4000 (S)	6"	20,000	50,000	200,000	4	Standard	Optional	PC-5-9504
ITR 4000-S	6"	20,000	50,000	200,000	4	Not Available	Standard	PC-5-9505

## REMOTE FEED TUBE REMOVAL SYSTEM

For removal and reinstallation of feed tubes on systems utilizing riser assemblies, remote feed tube removal systems shall be provided. Each remote feed tube removal system shall be provided with twist lock cap and threaded top extension. A corrosion resistant extension tool shall be threaded to each feed tube cap. One corrosion resistant extension handle shall be provided with each riser section to permit access to each feed tube from grade. The remote feed tube removal system shall allow for the extension handle, attached feed tube and cap to be removed, recharged and reinstalled by the operator with no additional tools or equipment required. Once installed, the feed tube removal handles and caps shall remain in place.

## BIO-SANITIZER® CHLORINATION TABLETS

The Bio-Dynamic tablet feeder shall be furnished complete with a (10 lb., 25 lb., 45 lb. or 100 lb.) supply of Bio-Sanitizer disinfecting tablets. Bio-Sanitizer disinfecting tablets shall be manufactured and tested to insure efficient and dependable disinfection for wastewater treatment system effluent and other applications where a predictable long-term source of chlorine is desirable. The dissolve rate of the tablets shall generally lower overall chemical use and provide for consistent control of chlorine residual. The tablets shall be manufactured from pure calcium hypochlorite and contain at least 70% available chlorine. The tablets shall incorporate beveled edges to enhance the chemical dissolution pattern and minimize wicking and jamming. Each tablet within the feed tube shall be  $2\frac{5}{8}$ " diameter, compressed to a  $\frac{13}{16}$ " thickness, weigh approximately 5 ounces and be white in color for easy identification. All flow through the system shall contact the Bio-Sanitizer tablets. The tablets shall dissolve slowly, releasing controlled amounts of chlorine for water or wastewater disinfection. The chlorine dosage rate shall be automatic and flow dependent. Periods of high flow shall expose more tablets to the liquid passing through the system and during periods of low flow, fewer tablets shall be exposed. The chemical application rate of the tablets shall remain consistent at peak flow factors as high as four.

## BIO-NEUTRALIZER® DECHLORINATION TABLETS

The Bio-Dynamic tablet feeder shall be furnished complete with a (25 lb. or 45 lb.) supply of Bio-Neutralizer dechlorination tablets. The dechlorination tablets shall contain active ingredients specially formulated to chemically neutralize both free and combined chlorine. The tablets shall incorporate beveled edges to enhance the chemical dissolution pattern and minimize wicking and jamming. Each tablet within the feed tube shall be  $2\frac{5}{8}$ " diameter, compressed to a  $\frac{13}{16}$ " thickness, weigh approximately 5 ounces and be green in color for easy identification. All flow through the system shall contact the Bio-Neutralizer tablets prior to discharge. The tablets shall dissolve slowly, releasing controlled amounts of chemical for the instantaneous removal of residual chlorine from the water or wastewater flow. The tablets shall provide a dechlorination rate that is automatic and flow dependent. The chemical application rate of the tablets shall remain consistent at peak flow factors as high as four. The tablets shall generally lower chemical consumption and provide reliable reduction of chlorine residual in a more thorough manner than simple, compressed sodium sulfite.

## LIMITED WARRANTY

The manufacturer shall provide a limited warranty against defects in material and workmanship under normal use and service for a period of ten years. The distributor shall provide a detailed copy of the warranty to the regulatory agency, contractor and customer as required.

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# *norweco*<sup>®</sup>

# **BLUE CRYSTAL**<sup>®</sup>

## **RESIDENTIAL DISINFECTING TABLETS**

### **GENERAL SPECIFICATIONS**

Blue Crystal tablets shall be formulated and produced to insure effective and dependable disinfection for wastewater systems subject to low, sustained, variable and intermittent flows. Blue Crystal tablets shall provide a sufficient dose of chlorine for positive disinfection of any residential wastewater system. The tablets shall be 2<sup>5</sup>/<sub>8</sub>" diameter, compressed to 1" thickness with an approximate weight of 5 oz. and incorporate beveled edges to insure consistent dosage. Standard calcium hypochlorite or trichloroisocyanurate tablets do not provide a sufficient chlorine dose for complete disinfection in low flow systems and therefore shall not be considered for this application.

### **TABLET PROPERTIES AND USAGE**

Blue Crystal disinfecting tablets shall be registered with the USEPA and all applicable State Departments of Agriculture as a wastewater microbiocide and disinfectant. The tablets shall have an active ingredient of 73% calcium hypochlorite and contain a minimum of 70% available chlorine. When used as directed, Blue Crystal disinfecting tablets shall provide a more economical, safe and convenient method of disinfection than ultraviolet or liquid based systems. The consistent dissolve rate of Blue Crystal disinfecting tablets shall provide an effective chemical dose and improved control over chlorine residual. Therefore, other tablets of similar composition shall not be considered for this application.

### **PRODUCT APPLICATION**

The 2<sup>5</sup>/<sub>8</sub>" diameter by 1" thick Blue Crystal tablets shall be utilized for the disinfection of wastewater treatment systems. The tablets shall maintain a consistent chemical application rate at intermittent peak flow factors as high as four and shall provide reliable effluent disinfection even when the significant runoff period is six hours. Blue Crystal tablets shall effectively disinfect typical wastewater flows, providing a chlorine residual that dissipates quickly to protect the receiving environment. The following is a list of common applications where the tablets can be used: septic tanks, aerobic treatment systems, sand filters, spray irrigation systems and marine sanitation devices.

### **DESIGN DATA**

Tablet Size	2 <sup>5</sup> / <sub>8</sub> " diameter, 1" thick
Approximate Tablet Weight	5 oz. (140 grams)
Active Ingredient	73% Calcium Hypochlorite – Ca(OCl) <sub>2</sub> • H <sub>2</sub> O
Minimum Available Chlorine	70%
Inert Ingredient Content	27%
EPA Registration	63243-4
Appearance Characteristics	White Tablet with Blue Crystals
Special Design Features	Beveled Edges

### **SPECIAL INSTRUCTIONS**

Blue Crystal disinfecting tablets are a strong oxidizing agent and highly corrosive. Contact with other chlorine compounds, oil or petroleum products is extremely dangerous – fire or explosion could result. Improper use of this product may cause personal injury or property damage. Tablets may be fatal if swallowed and tablet dust is irritating to the eyes, nose and throat. Keep out of the reach of children. Store only in sealed original container in a cool, dry, well-ventilated area. It is a violation of Federal Law to use Blue Crystal disinfecting tablets in a manner inconsistent with its labeling. Read the product container label and Blue Crystal disinfecting tablet Safety Instructions and Tablet Properties and Usage instructions before use. Always wear rubber gloves and either safety goggles or a face shield when handling Blue Crystal tablets.



CALCIUM HYPOCHLORITE,  
HYDRATED MIXTURES  
UN 2880

## PRODUCT STORAGE

Blue Crystal disinfecting tablets are a strong and highly corrosive oxidizing agent. Blue Crystal tablets should be stored in a cool, dry, well-ventilated area, away from heat or flame. Stock should be rotated on a first-in, first-out basis. Store Blue Crystal tablets in their original container with the lid tightly closed. Store tablets away from combustible materials such as paper, petroleum products, chemicals, rags or cardboard. In case of contamination or decomposition, do not reseal container and notify fire department immediately. If possible, isolate container in open air or a well-ventilated area. Flood tablets and container with large volumes of water to dissolve all materials, then discard container. Do not reuse the empty container.

## SAFETY INSTRUCTIONS

Before handling Blue Crystal tablets, carefully read the product container label and the Product Storage, Tablet Handling, Caution and First Aid sections of these instructions. Do not add Blue Crystal tablets to a feed tube containing the remnants of any other product, particularly oil and petroleum products or swimming pool chlorine – fire or explosion could result. Do not contaminate food or feed during the use, storage or disposal of Blue Crystal tablets or the cleaning of chemical feed equipment. Always wear rubber gloves and either safety goggles or a face shield when handling Blue Crystal tablets or working with any tablet chlorinator or chemical feed tube. Avoid contact with skin, eyes, mouth, respiratory system or clothing. Keep only in tightly closed original container. Store only in a cool, dry, well-ventilated area. Avoid moisture contamination.

## TABLET HANDLING

It is a violation of Federal Law to use Blue Crystal tablets in a manner inconsistent with the container label. It is a violation of Federal Law to sell the tablets in a package other than the original container and in the quantity shown on the label. Read the entire Blue Crystal tablet container label and these instructions carefully before handling this product. Mix only with water. Use only clean, dry utensils made of metal or plastic. Do not add Blue Crystal tablets to any dispensing device containing remnants of any other product. Such use may cause a violent reaction leading to fire, explosion and/or the release of toxic gas.

## FEED TUBE LOADING INSTRUCTIONS

1. Remove feed tube from dispenser housing.
2. Remove protective cap from feed tube; place cap in a clean, dry area.
3. Remove any tablet residue by gently tapping feed tube on concrete or stone surface. If tablets other than Blue Crystal have been used, rinse tube and cap with fresh water until clean and allow to dry before proceeding.
4. Hold tube, slotted end up, at a 45° angle and slide Blue Crystal disinfecting tablets into the tube, one tablet at a time.
5. Insure that all tablets lie flat, on top of one another, in the feed tube.
6. Use your gloved hand to retain tablets inside the open end of the inverted tube while filling.
7. Carefully return tube to upright position.
8. Replace the cap securely.
9. Place tube back into housing, slotted end down.
10. Be sure feed tube is fully engaged and rests evenly on the floor of the housing.
11. If the tablet feeder incorporates multiple feed tubes, consult the manufacturer's instructions to determine the correct number of tubes to be filled and their placement.



## CAUTION

Blue Crystal disinfecting tablets are highly corrosive. Contact with other chlorine products or reducing agents, such as swimming pool chemicals or Bio-Neutralizer dechlorination tablets, is extremely dangerous – fire or explosion could result. Keep out of the reach of children. Avoid contact with skin, eyes, mouth, ears and nose or clothing – failure to do so will cause irritation on contact. Always wear rubber gloves and either safety goggles or a face shield when handling this product. Avoid breathing tablet dust; it is irritating to the eyes, nose and throat and potentially fatal. Wash contaminated clothing before reuse.

**IN CASE OF EMERGENCY INVOLVING THIS PRODUCT, PHONE (800) 424-9300.**

## FIRST AID INSTRUCTIONS

If contact with skin occurs, remove clothing and wash with water for 15-20 minutes. If irritation occurs, seek medical attention. If eye contact occurs, hold eye open and flush with water for at least 15 minutes. Get immediate medical treatment. If swallowed, promptly drink large quantities of water. DO NOT induce vomiting. Avoid alcohol. Call physician immediately. If inhaled, move victim to fresh air and get immediate medical attention. In case of fire, immediately evacuate the area and notify the fire department.

# MATERIAL SAFETY DATA SHEET

## BLUE CRYSTAL® RESIDENTIAL DISINFECTING TABLETS

EMERGENCY TELEPHONE: (800) 424-9300

CHEMTREC #16012

DATE PREPARED: JANUARY 2014

### I. PRODUCT IDENTIFICATION

TRADE NAME	Blue Crystal®	IDENTIFICATION NUMBER	UN 2880
CHEMICAL NAME	Calcium Hypochlorite, Hydrated, Tablets	PACKING GROUP	II
CHEMICAL ABSTRACT SERVICE NO.	CAS #7778-54-3	REPORTABLE QUANTITY	10 pounds/4.5 Kg.
CHEMICAL FAMILY	Hypochlorite	HMS/NFPARATING	3/0/1
FORMULA	Ca (OCl) <sub>2</sub> • H <sub>2</sub> O	I.M.O. DESCRIPTION	Calcium Hypochlorite, Hydrated, Class 5.1, UN 2880,
U.S. DOT SHIPPING NAME	Calcium Hypochlorite, Hydrated		Packing Group II, IMDG
U.S. DOT HAZARD CLASS	5.1 Oxidizer		Code Page 5138

### II. INGREDIENTS

CALCIUM HYPOCHLORITE (70% Available Chlorine)	73%	INERT INGREDIENTS (Includes 5.5-10% Moisture and colorant)	27%
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### III. PHYSICAL DATA

BOILING POINT AT 760 mm Hg	Decomposes at 180° C	SOLUBILITY IN H <sub>2</sub> O; % BY WEIGHT	217 g/l at 27° C
SPECIFIC GRAVITY OF TABLET	1.94 (H <sub>2</sub> O = 1)	APPROXIMATE BULK DENSITY	61 lbs./ft <sup>3</sup>
pH OF SOLUTION	Alkaline	HEAT OF SOLUTION	Slightly Exothermic
APPEARANCE AND ODOR	White with Blue Crystals and Chlorine Odor	VOLUME % VOLATILE	Not Applicable

### IV. FIRE AND EXPLOSION DATA

FLASH POINT	None
EXTINGUISHING MEDIA	Water Only - Smothering Ineffective
SPECIAL FIRE FIGHTING PROCEDURES	NIOSH - Approved, positive pressure, self-contained breathing apparatus with full face piece for possible exposure to hazardous gas.
UNUSUAL FIRE & EXPLOSION HAZARD	Decomposes rapidly at 180° C, generating oxygen and heat. Containers may rupture. (Do <u>NOT</u> use dry extinguishers containing ammonium compounds).

### V. HEALTH HAZARD DATA

ACUTE TOXICITY DATA (ANIMAL)		CLASSIFICATION	
LC 50 INHALATION	(Rat) No Mortality at 3.5 mg/l (1 hour)	INHALATION	Irritating
LD 50 ORAL	850 mg/kg (Rat)	SKIN	Corrosive
LD 50 DERMAL	(Rabbit) > 1000 mg/kg	EYE	Corrosive
LC 50 AQUATIC	TLM 96 Hr.: 10-1 ppm	INGESTION	Toxic
CAUSES BURNS TO EYES AND SKIN		AQUATIC	Highly Toxic
CHRONIC TOXICITY	There are no known or reported effects from repeated exposure.		

### VI. EFFECTS OF OVEREXPOSURE

PERMISSIBLE	No permissible exposure limits have been established by OSHA.		
ACUTE			
INHALATION	Inhalation of this material is irritating to the nose, mouth, throat and lungs. It may also cause burns to the respiratory tract with the production of lung edema which can result in shortness of breath, wheezing, choking, chest pain and impairment of lung function. Inhalation of high concentrations can result in permanent lung damage. Chronic (repeated) inhalation exposure may cause impairment of lung function and permanent lung damage.		
EYE/SKIN	Severe irritation and/or burns can occur following eye exposure. Contact may cause impairment of vision and corneal damage. Contact with skin may cause severe irritation, burns, or tissue destruction.		
INGESTION	Irritation and/or burns can occur to the entire gastrointestinal tract, including the stomach and intestines, characterized by nausea, vomiting, diarrhea, abdominal pain, bleeding and/or tissue ulceration.		
CHRONIC	There are no known or reported effects from chronic exposure.		

### VII. EMERGENCY AND FIRST AID PROCEDURES

INHALATION	Remove to fresh air. Give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Seek medical attention immediately.
EYE CONTACT	Immediately flush with large amounts of water for fifteen (15) minutes, rinsing eye thoroughly. Get medical attention.
SKIN CONTACT	Wash with plenty of soap and water for fifteen (15) minutes. Remove contaminated clothing and wash before reuse. If skin irritation occurs, get medical attention.
INGESTION	If <u>conscious</u> , drink a large quantity of water and common vegetable oil. Do <u>NOT</u> induce vomiting. Take immediately to hospital. Avoid alcohol. If <u>unconscious</u> , or in convulsions, seek medical attention immediately. Do not give anything by mouth to an unconscious person.

### VIII. REACTIVITY DATA

STABILITY	Unstable.
CONDITIONS TO AVOID	Any form of contamination or excessive heat above 177° C.
INCOMPATIBILITY	Acids, combustible materials, organics, reducing agents, flammables, beverages, compounds containing nitrogen, dry powder fire extinguishers (containing mono-ammonium phosphate).
HAZARDOUS DECOMPOSITION PRODUCTS	Acids or ammonia contamination will release toxic gas. Excessive heat may cause decomposition and release chlorine gas.

### IX. SPILL AND LEAK PROCEDURE

USE EXTREME CAUTION IN HANDLING SPILLED MATERIAL. CONTAMINATION WITH ORGANIC OR COMBUSTIBLE MATERIAL MAY CAUSE FIRE OR VIOLENT DECOMPOSITION. IF FIRE OR DECOMPOSITION OCCURS IN AREA OF SPILL, IMMEDIATELY DOUSE WITH PLENTY OF WATER. OTHERWISE, SWEEP UP ALL VISIBLE MATERIAL USING A CLEAN, DRY SHOVEL AND BROOM AND DISSOLVE MATERIAL IN WATER. CARE MUST BE TAKEN WHEN USING OR DISPOSING OF CHEMICAL MATERIALS TO PREVENT ENVIRONMENTAL CONTAMINATION. IT IS YOUR DUTY TO DISPOSE OF THE CHEMICAL MATERIALS AND/OR THEIR CONTAINERS IN ACCORDANCE WITH THE CLEAN AIR ACT, THE CLEAN WATER ACT AND RCRA REGULATIONS.

### X. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION	If conditions are dusty, use NIOSH respirator with acid gas cartridge and dust pre-filter.
VENTILATION	Not required unless dusty conditions are encountered. Store and use in a well-ventilated area.
EYE PROTECTION	Chemical safety goggles.
GLOVES	Natural or synthetic rubber.
OTHER PROTECTIVE EQUIPMENT	Boots, aprons or chemical suits as required to prevent skin contact.

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# ADDITIONAL CHEMICAL PRODUCTS FROM NORWECO

## BIO-DYNAMIC® TABLET FEEDERS

Bio-Dynamic tablet feeders are a technological advancement in self-contained tablet dosing systems for water or wastewater treatment. A low cost, low maintenance and effective method of chemical treatment, Bio-Dynamic feeders have no mechanical components and require no electricity. The safety, accuracy and reliability of Bio-Dynamic feeders outperform gas, liquid and ultraviolet systems. With fifteen different models, Bio-Dynamic feeders accommodate a wide range of flows and plant conditions. Installation flexibility including direct burial, inline and contact chamber mounting provides many options for locating the feeder. Complete 24" riser assemblies are available for Series 2000 and 4000 tablet feeders, while the LF Series uses 4" PVC pipe and Norweco's remote removal system to allow service from grade. No model of Bio-Dynamic feeder will ever require confined space entry equipment under OSHA regulations. Molded inlet and outlet hubs allow the Bio-Dynamic feeder to be directly connected to treatment system piping without the need for a separate drop box. The tiered flow deck of the Bio-Dynamic feeder accommodates variable, intermittent and surge hydraulic flows into the system. The flow deck directs liquid to the feed tubes during low flows and disperses liquid velocity throughout the feeder during peak flows, resulting in consistent chemical application. In many models, chemical dosage is further controlled by interchangeable weir plates or an optional sluice that can be completely adjusted from a 1" to 3" outlet width. The sluice can be adjusted during tablet feeder operation using only a standard socket wrench with extension.



All models are backed by a ten year limited warranty. Standard components include one-piece feed tubes with twist lock caps, molded inlet and outlet hubs, molded mounting feet and Norweco's tiered flow deck.

## BIO-SANITIZER® DISINFECTING TABLETS

Bio-Sanitizer disinfecting tablets are uniquely formulated to provide efficient and reliable disinfection of water or wastewater treatment system flows. Bio-Sanitizer tablets provide treatment plant operators a consistent means to meet disinfection standards without exceeding new and stringent limits for total residual chlorine. Produced from a proprietary grade of calcium hypochlorite and containing a minimum of 70% available chlorine, Bio-Sanitizer tablets are registered by the U.S. Environmental Protection Agency and the Canadian Ministry of the Environment. With a unique beveled edge, Bio-Sanitizer tablets dissolve slowly and evenly, providing effective, economical bacteria killing power. Bio-Sanitizer disinfecting tablets are packaged in easy to open, resealable 10 lb., 25 lb., 45 lb. and 100 lb. Department of Transportation approved containers.

## BIO-NEUTRALIZER® DECHLORINATION TABLETS

Bio-Neutralizer dechlorination tablets are formulated to effectively remove free and combined chlorine from water or wastewater treatment system flows. Containing 35% active sodium sulfite, Bio-Neutralizer tablets will reduce or remove chlorine and protect water quality without degrading environmental conditions. Research shows that higher concentrations of sodium sulfite will reduce beneficial dissolved oxygen in receiving environments, producing harmful effects on the ecosystem. The superior formulation of Bio-Neutralizer dechlorination tablets provides consistent reduction or elimination of residual chlorine without affecting water quality, dissolved oxygen or other discharge parameters. Bio-Neutralizer tablets are packaged in easy to open, resealable 25 lb. and 45 lb. Department of Transportation approved containers.

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# **BIO-NEUTRALIZER**<sup>®</sup>

## **DECHLORINATION TABLETS**

### **GENERAL SPECIFICATIONS**

Bio-Neutralizer dechlorination tablets shall be formulated and produced to chemically neutralize both free and combined chlorine in water, wastewater and process water treatment systems. Bio-Neutralizer tablets shall be engineered to dissolve slowly and evenly, maintaining effluent quality without any loss of dissolved oxygen or increase in BOD<sub>5</sub>. The tablets shall be 2<sup>5</sup>/<sub>8</sub>" diameter, compressed to 1<sup>3</sup>/<sub>16</sub>" thickness with an approximate weight of 5 oz. and incorporate beveled edges to stabilize chemical release and to minimize maintenance requirements. Sulfur dioxide gas or liquid sodium metabisulfite systems create serious health hazards and handling concerns and therefore shall not be considered for this application.

### **TABLET PROPERTIES AND USAGE**

When used as directed, Bio-Neutralizer dechlorination tablets shall provide an environmentally safe dose of sodium sulfite capable of neutralizing free and combined chlorine present in treated water, wastewater or process water. Research shows that high concentrations of sodium sulfite will degrade beneficial dissolved oxygen in receiving environments, producing harmful effects on the ecosystem. Bio-Neutralizer tablets shall provide consistent reduction or elimination of residual chlorine without affecting water quality, dissolved oxygen or other discharge parameters. A unique combination of sustained release agents and sodium sulfite shall maintain a consistently uniform application rate regardless of flow, temperature or humidity. Bio-Neutralizer dechlorination tablets shall generally lower chemical consumption and provide reliable reduction of chlorine residual in a more thorough, safe and economical manner than simple compressed sodium sulfite. Therefore, the use of other tablets of similar composition shall not be considered for this application.

### **PRODUCT APPLICATION**

The 2<sup>5</sup>/<sub>8</sub>" diameter by 1<sup>3</sup>/<sub>16</sub>" thick Bio-Neutralizer tablets shall be effective in the reduction or elimination of residual chlorine without releasing excess quantities of sodium sulfite into the receiving environment. Bio-Neutralizer tablets shall maintain a consistent application rate at intermittent peak flow factors as high as four and shall provide reliable reduction of residual chlorine even when the significant runoff period is six hours. Bio-Neutralizer tablets shall be considered non-hazardous under U.S. Department of Transportation (DOT), U.S. Environmental Protection Agency (USEPA), RCRA, CERCLA and SARA Title III listings and consist solely of commercial grade or technical grade ingredients. The following is a list of some common applications where Bio-Neutralizer dechlorination tablets may be utilized: home wastewater treatment plants, municipal wastewater plants, septic tanks – sand filters, extended aeration plants, wastewater treatment lagoons, package wastewater treatment systems, spray irrigation systems, potable water filtration backwash, municipal water plants and water towers.

### **DESIGN DATA**

Tablet Size	2 <sup>5</sup> / <sub>8</sub> " diameter, 1 <sup>3</sup> / <sub>16</sub> " thick	Inert Ingredient Content	65%
Approximate Tablet Weight	5 oz. (140 grams)	U.S. DOT Hazard Class	Non-hazardous
Active Ingredient	Sodium Sulfite – Na <sub>2</sub> SO <sub>3</sub>	Appearance Characteristics	Green Tablet with Mild Odor
Active Ingredient Content	35%	Special Design Features	Beveled Edges

### **SPECIAL INSTRUCTIONS**

Read the entire product container label, the Material Safety Data Sheet and the Bio-Neutralizer Safety and Tablet Properties and Usage instructions before handling or use. Always wear rubber gloves and either safety goggles or a face shield when handling Bio-Neutralizer tablets or working with a tablet feeder or chemical feed tube. Refer to tablet feeder manufacturer's instructions to determine the correct number of tubes to fill with Bio-Neutralizer tablets. Store Bio-Neutralizer dechlorination tablets only in their tightly sealed original container. Do not store in direct sunlight or areas where temperature may exceed 140° F. Bio-Neutralizer dechlorination tablets are a strong reducing agent containing sodium sulfite. Contact with oil, petroleum products or oxidizing agents, such as Bio-Sanitizer disinfecting tablets or any tablet used for chlorination, is extremely dangerous. Do not mix with swimming pool chemicals. Bio-Neutralizer dechlorination tablets should be stored in a cool, dry, well-ventilated area for maximum shelf life. To prevent moisture contamination, exercise care when removing tablets from the container or filling feed tubes. Avoid contact with skin, eyes, mouth, respiratory system or clothing.

## PRODUCT STORAGE

Bio-Neutralizer dechlorination tablets are a strong reducing agent. Tablets should be stored in a cool, dry, well-ventilated area, away from heat or flame. Avoid storage in areas subject to direct sunlight or temperature in excess of 140° F. Stock should be rotated on a first-in, first-out basis. Bio-Neutralizer dechlorination tablets must be stored in their original container with lid tightly closed. Do not allow moisture to enter the pail during storage or while removing tablets for use. Moisture contamination may affect tablet integrity and performance. Do not reuse the empty container.

## SAFETY INSTRUCTIONS

Before handling Bio-Neutralizer tablets, carefully read the container label and the Product Storage, Tablet Handling, Caution and First Aid sections of these instructions. Do not add Bio-Neutralizer tablets to a feed tube containing any other product, particularly oil and petroleum products or swimming pool chlorine. Such action may cause a violent reaction leading to fire or explosion. Do not contaminate food or feed during the use, storage or disposal of Bio-Neutralizer tablets or the cleaning of chemical feed equipment. Always wear rubber gloves and either safety goggles or a face shield when handling Bio-Neutralizer tablets or working with any tablet feeder or feed tube. Avoid contact with skin, eyes, mouth, respiratory system or clothing. Keep this product only in its tightly closed original container. Store only in a cool, dry, well-ventilated area.

## TABLET HANDLING

Use only clean, dry utensils. Do not add Bio-Neutralizer dechlorination tablets to any device containing remnants of any other product – contact with oxidizers, such as Bio-Sanitizer disinfecting tablets or any other tablets used for chlorination can cause fire and the release of toxic gas. Read the entire Bio-Neutralizer tablet container label and these instructions carefully before handling this product. Use only in well-ventilated areas. Bio-Neutralizer tablets are not rated a hazardous substance by the U.S. DOT or USEPA, but necessary care should be taken in the use and handling of the tablets. Collected material can be dissolved in water, exercising caution as the solution can get hot. Dispose of dissolved material in any appropriate industrial waste collection system. Consult local, state and federal regulatory agencies before disposing of any material.

## FEED TUBE LOADING INSTRUCTIONS

1. Remove feed tube from dispenser housing.
2. Remove protective cap from feed tube; place cap in a clean, dry area.
3. Remove any tablet residue by gently tapping feed tube on concrete or stone surface. If tablets other than Bio-Neutralizer have been used, rinse tube and cap with fresh water until clean and allow to dry before proceeding.
4. Hold tube, slotted end up, at a 45° angle and slide Bio-Neutralizer dechlorination tablets into the tube, one tablet at a time.
5. Ensure that all tablets lie flat, on top of one another, in the feed tube.
6. Use your gloved hand to retain tablets inside the open end of the inverted tube while filling.
7. Carefully return tube to upright position.
8. Replace the cap securely.
9. Place tube back into housing, slotted end down.
10. Be sure feed tube is fully engaged and rests evenly on the floor of the housing.
11. If the tablet feeder incorporates multiple feed tubes, consult the manufacturer's instructions to determine the correct number of tubes to be filled and their placement.



## CAUTION

Do not mix Bio-Neutralizer dechlorination tablets with acids or oxidizing agents such as Bio-Sanitizer disinfecting tablets or other tablets used for chlorination – fire or explosion could result. Keep out of the reach of children. Avoid contact with skin, eyes, mouth, respiratory system or clothing – failure to do so may cause irritation on contact. Wear rubber gloves and either safety goggles or a face shield when handling this product. Product will form sodium sulfide at 600° C. At 900° C sulfur dioxide is formed. Inert ingredients could support combustion. Use self-contained breathing apparatus for fire fighting.

## FIRST AID INSTRUCTIONS

If contact with skin occurs, wash with water for 15 minutes. If irritation persists, seek medical attention.  
If eye contact occurs, flush with water for at least 15 minutes. Get immediate medical treatment.  
If swallowed, promptly drink large quantities of water or milk. Induce vomiting. Avoid alcohol. Call physician immediately.  
If inhaled, move victim to fresh air. If difficulty in breathing persists, get immediate medical attention.  
In case of fire, immediately evacuate the area and notify the fire department.

# MATERIAL SAFETY DATA SHEET

## BIO-NEUTRALIZER® DECHLORINATION TABLETS

EMERGENCY TELEPHONE: (800) 424-9300

CHEMTREC #16012

DATE PREPARED: JANUARY 2014

NOTE: THIS PRODUCT IS NOT RATED A HAZARDOUS MATERIAL BY THE U.S. DEPARTMENT OF TRANSPORTATION OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY. THE FOLLOWING DATA IS FOR INFORMATIONAL PURPOSES ONLY.

### I. PRODUCT IDENTIFICATION

TRADE NAME	Bio-Neutralizer®
CHEMICAL	Sodium Sulfite
CHEMICAL ABSTRACT SYSTEM NO.	CAS #7757-83-7
CHEMICAL DESCRIPTION	Reducer
FORMULA	Na <sub>2</sub> SO <sub>3</sub>
U.S. DOT SHIPPING NAME	Non-hazardous tablets, Item NM503401
U.S. DOT HAZARD CLASS	Non-hazardous

### II. INGREDIENTS

HAZARDOUS INGREDIENTS	None
NON-HAZARDOUS INGREDIENTS	Sodium Sulfite 35%
	Inert Ingredients 65% (Includes sustained release agents)

### III. PHYSICAL DATA

BOILING POINT AT 760 mm Hg	Decomposes at 900° C
FREEZING/MELTING POINT	Not Applicable
SOLUBILITY IN H <sub>2</sub> O; % BY WEIGHT	25% at 80° C
SPECIFIC GRAVITY OF TABLET	2.63 (H <sub>2</sub> O = 1)
APPROXIMATE TABLET DENSITY	125 lbs./ft <sup>3</sup>
pH OF SOLUTION	Alkaline
VOLUME % VOLATILE	Not Applicable
APPEARANCE AND ODOR	Green Tablet with Mild Odor

### IV. FIRE AND EXPLOSION DATA

FLASH POINT	Not Applicable
FLAMMABLE LIMITS IN AIR	Not Applicable
EXTINGUISHING MEDIA	Use extinguishing media appropriate for burning material. Compatible with water fog, spray foam or CO <sub>2</sub> .
SPECIAL FIRE FIGHTING PROCEDURES	NIOSH/MSHA-Approved, positive pressure, self-contained breathing apparatus with full face piece.
UNUSUAL FIRE & EXPLOSION HAZARD	At 600° C, Sodium Sulfide is formed. At 900° C, Sulfur Dioxide is formed. Inert ingredients could support combustion by burning, yielding carbon dioxide and water. Use self-contained breathing apparatus for fire fighting.

### V. HEALTH HAZARD DATA

#### ACUTE TOXICITY DATA (ANIMAL)

LC 50 INHALATION	See effects of overexposure.
LD 50 ORAL	2825 MG/KG (Rabbit)
LD 50 DERMAL	See effects of overexposure.
LC 50 AQUATIC	Very high concentrations will chemically deplete dissolved oxygen necessary for aquatic life.

#### CHRONIC TOXICITY

Sodium Sulfite may cause allergic reactions in sensitive individuals. Contact with strong acids or high temperatures may generate Sulfur Dioxide, which is toxic, corrosive and hazardous.

### VI. EFFECTS OF OVEREXPOSURE

**PERMISSIBLE** No permissible exposure limits have been established by OSHA.

#### ACUTE

INHALATION	Inhalation of product dust or solution may cause respiratory tract irritation.
EYE	Dust or solution may burn eyes on contact.
SKIN	Product dust or solution may result in skin irritation upon prolonged contact.
INGESTION	Ingestion may irritate gastrointestinal tract. Toxic if taken in large doses.

### VII. EMERGENCY AND FIRST AID PROCEDURES

<b>INHALATION</b>	Remove to fresh air. If not breathing, resuscitate and administer oxygen if readily available. Seek medical attention immediately.
<b>EYE CONTACT</b>	Immediately flush with large amounts of water for fifteen (15) minutes, rinsing eye thoroughly. Get medical attention.
<b>SKIN CONTACT</b>	Wash with plenty of soap and water for fifteen (15) minutes. Remove contaminated clothing. If skin irritation occurs, get medical attention. Wash clothing before reuse.
<b>INGESTION</b>	If <u>conscious</u> , drink large quantities of water or milk and induce vomiting. Call a physician immediately. Avoid alcohol. If <u>unconscious</u> , or in convulsions, seek medical attention immediately. Do not give anything by mouth to an unconscious person.

### VIII. STEPS FOR MATERIAL SPILL

Spills exceeding 100 pounds should be reported to the local authorities.

1. Contain all spilled material, wearing appropriate protective equipment.
2. Place spilled material in clean, dry containers for disposal. Do not flush to surface water.

#### WASTE DISPOSAL METHOD

Not rated a hazardous substance by USEPA. Collected material can be dissolved in water, exercising caution. Dissolved material may be discharged into an appropriate industrial waste collection system but consult local, state and federal regulating agencies before disposing of any material.

### IX. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION	If dusty conditions are encountered, use NIOSH/MSHA respirator with acid gas cartridge and dust pre-filter.
VENTILATION	Store and use in a well-ventilated area.
EYE PROTECTION	Chemical safety goggles.
GLOVES	Natural or synthetic rubber.
OTHER PROTECTIVE EQUIPMENT	Boots, aprons or chemical suits as required to prevent skin contact.

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# ADDITIONAL CHEMICAL PRODUCTS FROM NORWECO

## BIO-DYNAMIC® TABLET FEEDERS

Bio-Dynamic tablet feeders are a technological advancement in self-contained tablet dosing systems for water or wastewater treatment. A low cost, low maintenance and effective method of chemical treatment, Bio-Dynamic feeders have no mechanical components and require no electricity. The safety, accuracy and reliability of Bio-Dynamic feeders outperform gas, liquid and ultraviolet systems. With fifteen different models, Bio-Dynamic feeders accommodate a wide range of flows and plant conditions. Installation flexibility including direct burial, inline and contact chamber mounting provides many options for locating the feeder. Complete 24" riser assemblies are available for Series 2000 and 4000 tablet feeders, while the LF Series uses 4" PVC pipe and Norweco's remote removal system to allow service from grade. No model of Bio-Dynamic feeder will ever require confined space entry equipment under OSHA regulations. Molded inlet and outlet hubs allow the Bio-Dynamic feeder to be directly connected to treatment system piping without the need for a separate drop box. The tiered flow deck of the Bio-Dynamic feeder accommodates variable, intermittent and surge hydraulic flows into the system. The flow deck directs liquid to the feed tubes during low flows and disperses liquid velocity throughout the feeder during peak flows, resulting in consistent chemical application. In many models, chemical dosage is further controlled by interchangeable weir plates or an optional sluice that can be completely adjusted from a 1" to 3" outlet width. The sluice can be adjusted during tablet feeder operation using only a standard socket wrench with extension.



All models are backed by a ten year limited warranty. Standard components include one-piece feed tubes with twist lock caps, molded inlet and outlet hubs, molded mounting feet and Norweco's tiered flow deck.

## BIO-SANITIZER® DISINFECTING TABLETS

Bio-Sanitizer disinfecting tablets are uniquely formulated to provide efficient and reliable disinfection of water or wastewater treatment system flows. Bio-Sanitizer tablets provide treatment plant operators a consistent means to meet disinfection standards without exceeding new and stringent limits for total residual chlorine. Produced from a proprietary grade of calcium hypochlorite and containing a minimum of 70% available chlorine, Bio-Sanitizer tablets are registered by the U.S. Environmental Protection Agency and the Ministry of the Environment. With a unique beveled edge, Bio-Sanitizer tablets dissolve slowly and evenly, providing effective, economical bacteria killing power. Bio-Sanitizer disinfecting tablets are packaged in easy to open, resealable 10 lb., 25 lb., 45 lb. and 100 lb. Department of Transportation approved containers.

## BIO-GEM® ORGANIC DIGESTER

A blend of bacteria, enzymes and natural growth accelerators, Bio-Gem organic digester effectively digests grease, fats and oils in wastewater treatment systems, lift stations, septic tanks, sand filters, drain lines and commercial grease traps. When used as directed, Bio-Gem liquid will quickly and effectively convert common grease, fats and oils into carbon dioxide and water. This organic digestion process is much more effective and reliable than compounds that merely emulsify the grease, fats and oils, sending the problem to downstream treatment processes. Regular use of Bio-Gem liquid will reduce odors, stabilize effluent quality, reduce system maintenance and minimize tank pump-out frequency. Packaged in one or five gallon containers and 55 gallon drums, Bio-Gem organic digester is environmentally safe and works in aerobic or anaerobic conditions.

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*Engineering the future of water  
and wastewater treatment*

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# ***norweco***<sup>®</sup>

# **BIO-PERC**<sup>®</sup>

## **BIOLOGICAL REMEDIATION TABLETS**

### **GENERAL SPECIFICATIONS**

Bio-Perc biological remediation tablets shall improve the performance of new or failing wastewater treatment and disposal systems by naturally removing organic material. Bio-Perc tablets shall be engineered to dissolve slowly and evenly, providing a consistent dose of select bacteria regardless of variations in the hydraulic flow rate of the system. The tablets shall be 2<sup>5</sup>/<sub>8</sub>" diameter, compressed to 1" thickness with an approximate weight of 5 oz. and incorporate beveled edges to insure consistent dosage. Liquid or powder bioaugmentation products do not provide consistent bacterial dosage during variable flow conditions and therefore shall not be considered for this application.

### **TABLET PROPERTIES AND USAGE**

When used as directed, Bio-Perc tablets shall provide a long-term, flow proportional dose of select bacterial cultures that shall naturally digest organic material. As part of a general maintenance program, Bio-Perc tablets shall enhance the performance of aerobic or anaerobic wastewater treatment systems by reducing and eliminating organic solids. Bio-Perc tablets shall remediate failing sand filters or soil-based disposal systems, allowing the system to digest accumulated organic material and naturally recover its percolation capacity. The proprietary combination of sustained release agents, dissolve rate stabilizers, enzymes and bacterial cultures shall maintain a consistent application rate regardless of changes in flow, temperature, humidity, organic or hydraulic loading. Bio-Perc tablets shall be more effective than liquid or powder bacterial products and shall reduce long-term maintenance costs of an overloaded wastewater treatment or disposal system. Therefore, the use of other biological products or formulations shall not be considered for this application.

### **PRODUCT APPLICATION**

The 2<sup>5</sup>/<sub>8</sub>" diameter by 1" thick Bio-Perc tablets shall accelerate the digestion process that naturally occurs in wastewater disposal systems and shall extend the useful life of any biological treatment process. Bio-Perc tablets shall maintain a consistent application rate at intermittent peak flow factors as high as four and shall provide reliable dosage even when the significant runoff period is six hours. Bio-Perc tablets shall be considered non-hazardous under U.S. Department of Transportation (DOT), U.S. Environmental Protection Agency (USEPA), RCRA, CERCLA and SARA Title III listings. The following is a list of some common applications where Bio-Perc tablets may be utilized: septic tanks, leach fields, surface sand filters, subsurface sand filters, sand trenches, aerobic treatment systems, anaerobic treatment systems, cesspools, mounds, low pressure distribution systems, evapotranspiration beds, constructed wetlands, septic tank effluent pump (STEP) systems and any other system prone to failure from the buildup of organic material.

### **DESIGN DATA**

Tablet Size	2 <sup>5</sup> / <sub>8</sub> " diameter, 1" thick	Inert Ingredients	Dissolve Rate Stabilizers
Approximate Tablet Weight	5 oz. (140 grams)	U.S. DOT Hazard Class	Non-hazardous
Active Ingredient	Select Bacterial Cultures	Appearance Characteristics	Bronze Tablet with Mild Odor
Active Ingredient Content	220 Billion/Pound	Special Design Features	Beveled Edges

### **SPECIAL INSTRUCTIONS**

Read the entire product container label, the Material Safety Data Sheet and the Bio-Perc Safety and Tablet Properties and Usage instructions before handling or use. Always wear rubber gloves and either safety goggles or a face shield when handling Bio-Perc tablets or working with a tablet feeder or feed tube. Refer to tablet feeder manufacturer's instructions to determine the correct number of tubes to fill with tablets. Store Bio-Perc tablets only in their tightly sealed original container. Do not store in direct sunlight or areas where temperature may exceed 140° F. Contact with oil, petroleum products or oxidizing agents, such as Bio-Sanitizer tablets, Blue Crystal tablets or any tablet used for chlorination, is extremely dangerous. Do not mix with swimming pool chemicals. Strong acids or alkali compounds may inactivate biological cultures or cause adverse chemical reactions. Store in a cool, dry, well-ventilated area. Exposure of immunocompromised individuals to this biological product is not recommended and should be avoided. To prevent moisture contamination, exercise care when removing tablets from the container or filling feed tubes. Avoid contact with skin, eyes, mouth, respiratory system or clothing.

## PRODUCT STORAGE

Bio-Perc biological remediation tablets contain spore-forming microorganisms and dissolve rate stabilizers. Tablets should be stored in a cool, dry, well-ventilated area, away from heat or flame. Avoid storage in areas subject to direct sunlight or temperature in excess of 140° F. Stock should be rotated on a first-in, first-out basis. Bio-Perc tablets must be stored in their original container with the lid tightly closed. Do not allow moisture to enter the pail during storage or while removing tablets for use. Moisture contamination may affect tablet integrity and performance. Do not reuse the empty container.

## SAFETY INSTRUCTIONS

Before handling Bio-Perc tablets, carefully read the container label and the Product Storage, Tablet Handling, Caution and First Aid sections of these instructions. Do not add Bio-Perc tablets to a feed tube containing any other product, particularly oil and petroleum products or swimming pool chlorine. Such action may cause a violent reaction leading to fire or explosion. Do not contaminate food or feed during the use, storage or disposal of Bio-Perc tablets or the cleaning of chemical feed equipment. Always wear rubber gloves and either safety goggles or a face shield when handling Bio-Perc tablets or working with any tablet feeder or feed tube. Avoid contact with skin, eyes, mouth, respiratory system or clothing. Keep this product only in its tightly closed original container. Store only in a cool, dry, well-ventilated area.

## TABLET HANDLING

Use only clean, dry utensils. Do not add tablets to any device containing remnants of any other product – contact with oxidizers, such as Bio-Sanitizer tablets, Blue Crystal tablets or any other tablets used for chlorination may cause a hazardous chemical reaction. Read the entire Bio-Perc tablet container label and these instructions carefully before handling this product. Use only in well-ventilated areas. Bio-Perc tablets are not rated a hazardous substance by the USDOT or USEPA, but necessary care should be taken in the use and handling of the tablets. Collected material can be dissolved in water, exercising caution, as the solution can get hot. Dispose of dissolved material in any appropriate industrial waste collection system. Consult local, state and federal regulatory agencies before disposing of any material.

## FEED TUBE LOADING INSTRUCTIONS

1. Remove feed tube from dispenser housing.
2. Remove protective cap from feed tube; place cap in a clean, dry area.
3. Remove any tablet residue by gently tapping feed tube on concrete or stone surface. If tablets other than Bio-Perc have been used, rinse tube and cap with fresh water until clean and allow to dry before proceeding.
4. Hold tube, slotted end up, at a 45° angle and slide Bio-Perc tablets into the tube, one tablet at a time.
5. Insure that all tablets lie flat, on top of one another, in the feed tube.
6. Use your gloved hand to retain tablets inside the open end of the inverted tube while filling.
7. Carefully return tube to upright position.
8. Replace the cap securely.
9. Place tube back into housing, slotted end down.
10. Be sure feed tube is fully engaged and rests evenly on the floor of the housing.
11. If the tablet feeder incorporates multiple feed tubes, consult the manufacturer's instructions to determine the correct number of tubes to be filled and their placement.



## CAUTION

Do not mix Bio-Perc tablets with acids or oxidizing agents such as Bio-Sanitizer tablets, Blue Crystal tablets or other tablets used for chlorination – fire or explosion could result. Keep out of the reach of children. Avoid contact with skin, eyes, mouth, respiratory system or clothing – failure to do so may cause irritation on contact. Wear rubber gloves and either safety goggles or a face shield when handling this product. Avoid breathing tablet dust. Wash contaminated clothing before reuse. Inert ingredients could support combustion at elevated temperatures. Use self-contained breathing apparatus for fire fighting.

## FIRST AID INSTRUCTIONS

If contact with skin occurs, remove clothing and wash with water for 15-20 minutes. If irritation develops, seek medical attention. If eye contact occurs, hold eye open and flush with water for at least 15 minutes. Get immediate medical treatment. If swallowed, promptly drink large quantities of water or milk. Induce vomiting. Avoid alcohol. Call physician immediately. If inhaled, move victim to fresh air. If difficulty in breathing persists, get immediate medical attention. In case of fire, immediately evacuate the area and notify the fire department.

# MATERIAL SAFETY DATA SHEET

## BIO-PERC® BIOLOGICAL REMEDIATION TABLETS

EMERGENCY TELEPHONE: (800) 424-9300

CHEMTREC #16013

DATE PREPARED: JANUARY 2014

**NOTE: THIS PRODUCT IS NOT RATED A HAZARDOUS MATERIAL BY THE U.S. DEPARTMENT OF TRANSPORTATION OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY. THE FOLLOWING DATA IS FOR INFORMATIONAL PURPOSES ONLY.**

### I. PRODUCT IDENTIFICATION

TRADE NAME	Bio-Perc®
CHEMICAL	Bacterial Formulation
CHEMICAL ABSTRACT SYSTEM NO.	Not Applicable
CHEMICAL DESCRIPTION	Not Applicable
FORMULA	Compound Product
U.S. DOT SHIPPING NAME	Non-hazardous tablets, Item NM20400
U.S. DOT HAZARD CLASS	Non-hazardous

### II. INGREDIENTS

HAZARDOUS INGREDIENTS	None
NON-HAZARDOUS INGREDIENTS	Viable non-pathogenic bacterial cultures Dissolve rate stabilizers

### III. PHYSICAL DATA

BOILING POINT AT 760 mm Hg	Decomposes at 200° C
FREEZING/MELTING POINT	Not Applicable
SOLUBILITY IN H <sub>2</sub> O; % BY WEIGHT	15% @ 20° C
SPECIFIC GRAVITY OF TABLET	2.00 (H <sub>2</sub> O=1)
APPROXIMATE TABLET DENSITY	125 lbs./ft <sup>3</sup>
pH OF SOLUTION	Alkaline
VOLUME % VOLATILE	Not Applicable
APPEARANCE AND ODOR	Bronze Tablet with Mild Odor

### IV. FIRE AND EXPLOSION DATA

FLASH POINT	Not Applicable
FLAMMABLE LIMITS IN AIR	Not Applicable
EXTINGUISHING MEDIA	Use extinguishing media appropriate for burning material. Compatible with water fog, spray foam or CO <sub>2</sub> .
SPECIAL FIRE FIGHTING PROCEDURES	NIOSH - Approved, positive pressure, self-contained breathing apparatus with full face piece.
UNUSUAL FIRE & EXPLOSION HAZARD	Inert ingredients could support combustion by burning, yielding carbon dioxide and water.

### V. HEALTH HAZARD DATA

#### ACUTE TOXICITY DATA (ANIMAL)

LC 50 INHALATION	Limited toxicity-see effects of overexposure
LD 50 ORAL	Limited toxicity-see effects of overexposure
LD 50 DERMAL	Limited toxicity-see effects of overexposure
LC 50 AQUATIC	Limited toxicity

#### CHRONIC TOXICITY

May cause allergic reactions in sensitive individuals. Avoid prolonged contact. Contact with lime dust and moisture will produce Sodium Hydroxide, which is toxic, corrosive and hazardous.

### VI. EFFECTS OF OVEREXPOSURE

<u>PERMISSIBLE</u>	No permissible exposure limits have been established by OSHA.
<u>ACUTE</u>	
INHALATION	Inhalation of product dust or solution may cause respiratory tract irritation.
EYE	Dust or solution may burn eyes on contact.
SKIN	Product dust or solution may result in skin irritation upon prolonged contact.
INGESTION	Ingestion may irritate gastrointestinal tract. Toxic if taken in large doses.

### VII. EMERGENCY AND FIRST AID PROCEDURES

<u>INHALATION</u>	Remove to fresh air. If not breathing, resuscitate and administer oxygen if readily available. Seek medical attention immediately.
<u>EYE CONTACT</u>	Immediately flush with large amounts of water for fifteen (15) minutes, rinsing eye thoroughly. Get medical attention.
<u>SKIN CONTACT</u>	Wash with plenty of soap and water for fifteen (15) minutes. Remove contaminated clothing. If skin irritation occurs, get medical attention. Wash clothing before reuse.
<u>INGESTION</u>	If <u>conscious</u> , drink large quantities of water or milk and induce vomiting. Call a physician immediately. Avoid alcohol. If <u>unconscious</u> , or in convulsions, seek medical attention immediately. Do not induce vomiting or give anything by mouth to an unconscious person.

### VIII. STEPS FOR MATERIAL SPILL

Spills exceeding 100 pounds should be reported to the local authorities.

1. Contain all spilled material, wearing appropriate protective equipment.
2. Place spilled material in clean, dry containers for disposal. Do not flush to surface water.

#### WASTE DISPOSAL METHOD

Not rated a hazardous substance by USEPA. Collected material can be dissolved in water, exercising caution. Dissolved material may be discharged into an appropriate industrial waste collection system but consult local, state and federal regulating agencies before disposing of any material. Contact with acids will release carbon dioxide gas. Material mixed with lime dust and water will produce corrosive Sodium Hydroxide (caustic soda).

### IX. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION	If dusty conditions are encountered, use NIOSH approved respirator with acid gas cartridge and dust pre-filter.
VENTILATION	Store and use in a well-ventilated area.
EYE PROTECTION	Chemical safety goggles.
GLOVES	Natural or synthetic rubber.
OTHER PROTECTIVE EQUIPMENT	Boots, aprons or chemical suits as required to prevent skin contact.

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# ADDITIONAL CHEMICAL PRODUCTS FROM NORWECO

## BIO-DYNAMIC® TABLET FEEDERS

Bio-Dynamic tablet feeders are a technological advancement in self-contained tablet dosing systems for water or wastewater treatment. A low cost, low maintenance and effective method of chemical treatment, Bio-Dynamic feeders have no mechanical components and require no electricity. The safety, accuracy and reliability of Bio-Dynamic feeders outperform gas, liquid and ultraviolet systems. With fifteen different models, Bio-Dynamic feeders accommodate a wide range of flows and plant conditions. Installation flexibility including direct burial, inline and contact chamber mounting provides many options for locating the feeder. Complete 24" riser assemblies are available for Series 2000 and 4000 tablet feeders, while the LF Series uses 4" PVC pipe and Norweco's remote removal system to allow service from grade. No model of Bio-Dynamic feeder will ever require confined space entry equipment under OSHA regulations. Molded inlet and outlet hubs allow the Bio-Dynamic feeder to be directly connected to treatment system piping without the need for a separate drop box. The tiered flow deck of the Bio-Dynamic feeder accommodates variable, intermittent and surge hydraulic flows into the system. The flow deck directs liquid to the feed tubes during low flows and disperses liquid velocity throughout the feeder during peak flows, resulting in consistent chemical application. In many models, chemical dosage is further controlled by interchangeable weir plates or an optional sluice that can be completely adjusted from a 1" to 3" outlet width. The sluice can be adjusted during tablet feeder operation using only a standard socket wrench with extension.



All models are backed by a ten year limited warranty. Standard components include one-piece feed tubes with twist lock caps, molded inlet and outlet hubs, molded mounting feet and Norweco's tiered flow deck.

## BLUE CRYSTAL® RESIDENTIAL DISINFECTING TABLETS

Blue Crystal tablets are the first disinfectant that has been specifically developed for use in residential wastewater treatment applications. Formulated to maintain positive disinfection during the low, sustained, variable and intermittent flow rates that are common to residential systems, Blue Crystal tablets reduce 99% of bacteria within the first ten minutes of contact. Containing a minimum of 70% available chlorine, Blue Crystal tablets are registered by the U.S. Environmental Protection Agency for wastewater treatment. Produced with a proprietary beveled edge design, Blue Crystal tablets dissolve in direct proportion to the incoming hydraulic flow rate, providing effective, economical bacteria killing power. Blue Crystal residential disinfecting tablets are packaged in easy to open, resealable 1.9 lb., 10 lb. and 100 lb. Department of Transportation approved containers.

## BIO-NEUTRALIZER® DECHLORINATION TABLETS

Bio-Neutralizer dechlorination tablets are formulated to effectively remove free and combined chlorine from water or wastewater treatment system flows. Containing 35% active sodium sulfite, Bio-Neutralizer tablets will reduce or remove chlorine and protect water quality without degrading environmental conditions. Research shows that higher concentrations of sodium sulfite will reduce beneficial dissolved oxygen in receiving environments, producing harmful effects on the ecosystem. The superior formulation of Bio-Neutralizer dechlorination tablets provides consistent reduction or elimination of residual chlorine without affecting water quality, dissolved oxygen or other discharge parameters. Bio-Neutralizer tablets are packaged in easy to open, resealable 25 lb. and 45 lb. Department of Transportation approved containers.

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# ***norweco***® **HYDRO-KINETIC**®

## WASTEWATER TREATMENT SYSTEM

# TANK PUMPING INSTRUCTIONS

These instructions provide a general guideline concerning when and how to pump out the Hydro-Kinetic system. This literature supplements other instructional materials included in the Hydro-Kinetic System Product Manual.

In order to maximize performance, protect system components and insure protection of the surrounding environment, the Hydro-Kinetic system should be thoroughly checked every 12 months by a factory-trained Norweco service technician. An initial service program that provides regular service inspections during the first two years of system operation is included in the system purchase price. Renewable service contracts to extend these routine inspections after the initial program expires are available from the local licensed Norweco distributor.

The pretreatment chamber of the Hydro-Kinetic system will periodically require pumping. Because the Hydro-Kinetic system is a biological treatment device, the time frames listed within these instructions are estimates. Actual pumping frequency will depend on the amount and strength of the wastewater being treated. Handling and disposal of pretreatment chamber contents, referred to as septage, or the contents of the anoxic, aeration and clarification chambers and Hydro-Kinetic Bio-Film reactor, referred to as biosolids, are regulated by local, state and federal authorities. Disposal options may include land application, lagoon treatment, municipal wastewater treatment or landfill disposal. Prior to arranging for tank pumping, contact the Norweco distributor to obtain complete information on access to chambers, removing equipment, coordination of services and disposal of tank contents.

During Hydro-Kinetic system installation and backfilling, do not allow dirt or mud to enter the system. Once in the system, dirt or mud will form a heavy sludge which will affect settling characteristics, interfere with filtration and degrade effluent quality. If dirt or mud enters the system, it must be removed to insure proper system operation. Removing the dirt or mud may require repeated flushing and tank pumping. For additional details refer to Hydro-Kinetic Tank Delivery and Setting instructions.

## INTRODUCTION

The Hydro-Kinetic system is a biological treatment device and should not require pumping as frequently as a septic tank. Septic tanks are designed to store solids and perform limited biological treatment. Frequent pumping of a septic tank is mandatory to remove and dispose of these solids before they discharge from the tank. The Hydro-Kinetic system is designed to biologically treat all incoming wastewater and return only a high quality effluent to the environment. The multiple operating processes contained within the plant accomplish primary, secondary and tertiary treatment in each Hydro-Kinetic system. The pretreatment chamber of the Hydro-Kinetic system is designed to retain non-biodegradable solids and allow biodegradable solids to flow into the anoxic chamber. The anoxic and aerobic treatment process in the Hydro-Kinetic system utilizes these biodegradable solids to convert the wastewater into carbon dioxide and water. This natural biological process minimizes the accumulation of solids and eliminates the need to pump the system as frequently as a septic tank. Because the Hydro-Kinetic system utilizes the biodegradable material found in wastewater to perform biological treatment, pumping the system more often than needed will not improve operational performance. Removal of the solids in the Hydro-Kinetic system will be required when indicated by an inspection or evaluation as outlined herein.

## WHEN TO PUMP

Norweco distributors provide maintenance and service inspections free of charge at regular intervals during the initial two year warranty period. These routine service inspections will determine if a pretreatment chamber evaluation is necessary. The pretreatment chamber and aeration chamber should be evaluated by a factory-trained technician at least every three years to determine if pumping is required. Pumping of the system by a licensed tank pumping and disposal service will likely be necessary at 3 to 5 year intervals, based on variations in system occupancy, usage and loading.

## ROUTINE SERVICE INSPECTIONS

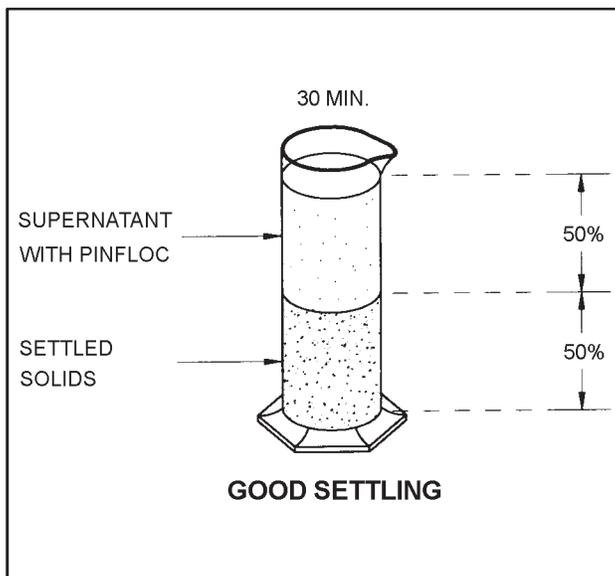
Regular service inspection procedures are outlined in detail in the Hydro-Kinetic System Product Manual. These routine service procedures include inspection of the anoxic chamber, aeration chamber, clarification chamber and effluent line to determine if the pretreatment chamber should be evaluated. A brief outline of these routine service procedures, as well as the detailed steps required to perform a comprehensive pretreatment chamber evaluation, are listed here. The results of the routine service inspection, pretreatment chamber evaluation and tank pumping (when performed) should be noted on the Service Inspection Card.

## AERATION CHAMBER INSPECTION

A summary of the aeration chamber inspection procedure is listed below. For complete details on aeration chamber service, refer to the Hydro-Kinetic Product Manual.

**CAUTION: Any time an air pump, recirculation pump or service pump is connected or disconnected, first shut off the power switch in each Service Pro control center. Failure to do so could result in personal injury or equipment damage.**

1. Inspect the vent cap, perimeter vent and air pump for objects, plants, insects or debris that could impede the air intake. Remove these items if present.
2. Remove the vented concrete aeration chamber access cover and set aside.
3. Check the air pump for proper operation. Check the air filter and clean or replace as required. Check the aeration chamber for odor. A musty odor indicates the presence of aerobic conditions essential for proper treatment. A septic odor indicates inadequate aeration, suggesting that the delivery of air into the aeration chamber has been restricted.
4. Check the aeration chamber and insure the diffuser assembly is creating a rolling motion of the chamber contents. If a rolling motion is not visible, verify air pump operation. Remove and clean diffuser assembly if necessary, as outlined in the Air Delivery and Recirculation System Service instructions.
5. Unplug the air pump and secure the closure cap in position to protect the electrical connector. Disassemble the union in the air line.
6. Lift the air pump straight up out of the access opening and lay it on the vented cover. Remove the concrete air pump mounting pad.
7. Visually check the aeration chamber surface for the presence of grease or oil. An accumulation of these materials indicates the pretreatment chamber should be evaluated.
8. Check the aeration chamber contents for the presence of non-biodegradable materials, paper, mop fibers, hair, grease or oil. A significant accumulation of these materials in the aeration chamber indicates the pretreatment chamber should be evaluated.



## SETTLEABLE SOLIDS TEST

A settleable solids test should be conducted as part of the aeration chamber evaluation during each routine service inspection to monitor system performance.

To insure a well mixed sample is collected for the test, make sure the air pump has been running for at least 10 minutes. Collect the sample immediately after turning off and removing the air pump and before the aeration chamber contents begin to settle. Insert a sludge sampling device into the aeration chamber to a depth of 3 feet and withdraw a sample. Transfer the contents to a graduated cone or other clear container. Set the container on a level surface and allow the solids to "settle" for 30 minutes while you complete the service inspection. Do not disturb the container during the test.

After 30 minutes, read the level of solids and compare it with the total volume in the container. Calculate the percentage

of settled solids volume (i.e.  $\frac{1}{2}$  full of solids equals 50%). If the settled material contains large pockets of clear liquid, estimate the volume of these pockets and reduce the percentage by that amount. A settled solids reading of up to 80% indicates no adjustments are necessary. **NOTE:** The solids should settle within the 30 minute test. System start-up, or periods of low organic loading will result in solids that are too light to settle, and will appear as a full container with no separation. This should not be interpreted as having excess solids and system operation can continue without adjustment.

A settled solids level greater than 80% indicates excessive solids in the aeration chamber and a pretreatment chamber evaluation must be performed. Refer to the "Pretreatment Chamber Evaluation" section of these instructions for details.

In Hydro-Kinetic systems with more than one air pump, the settleable solids test should be conducted for each aeration chamber. The results of all tests should be averaged to determine the appropriate action.

The results of the settleable solids test should be recorded on the Service Inspection Card.

## ANOXIC CHAMBER INSPECTION

A summary of the anoxic chamber inspection procedure is listed below. For complete details on anoxic chamber service, refer to the Hydro-Kinetic Product Manual.

1. Remove the anoxic chamber access cover and set aside.

2. Insure the mixing bar is operational. The recirculation pump operates on a pre-programmed on/off cycle, so press the reset button if necessary to verify operation.
3. The accumulation of grease, oil or non-biodegradable material in the anoxic chamber indicates the pretreatment chamber should be evaluated.

## CLARIFICATION CHAMBER INSPECTION

*A summary of the clarification chamber inspection procedure is listed below. For complete details on clarification chamber service, refer to the Hydro-Kinetic Product Manual.*

1. Remove the clarification chamber access cover and set aside.
2. Inspect the flow equalization device. Rinse the design flow, sustained flow and peak flow ports with a garden hose and insure they are free of debris. Clean the flow ports with a brush if necessary.
3. Install the Outlet Sealing Tool into the receiving flange to prevent loss of liquid from the Hydro-Kinetic system during service.
4. Remove the flow equalization device and set aside.
5. Unplug the recirculation pump and secure the closure cap in position to protect the electrical connector.
6. Disassemble the union in the pump discharge plumbing.
7. Carefully remove the recirculation pump and set aside.
8. Check the surface of the clarification chamber for the presence of grease or biologically untreatable material. A significant accumulation of these materials would indicate that the pretreatment chamber should be evaluated.
9. Use the hopper scraping tool to gently scrape all areas of the clarification chamber hopper side walls.
10. Complete the clarification chamber service as outlined in the Air Delivery and Recirculation System Service instructions of the Hydro-Kinetic Product Manual.
11. Make appropriate notations on the Hydro-Kinetic Service Inspection Card and on the Owner's Manual.

## EFFLUENT LINE INSPECTION

Check the groundwater relief point installed in the effluent disposal line to make sure it is free of obstruction. An accumulation of paper, fibers, hair or grease indicates that the Hydro-Kinetic system needs to be pumped. If there is a surface discharge point, make sure that it is free of debris, foam, mud, etc. Make appropriate notations on the Service Inspection Card.

## PRETREATMENT CHAMBER EVALUATION

The pretreatment chamber must be evaluated within three years of system start-up or the most recent tank pumping. An evaluation must also take place any time a routine service inspection indicates the chamber may be discharging excessive solids. This evaluation includes measuring the depth of the floating scum and settled sludge layers to determine if pumping is required. If the pretreatment chamber evaluation indicates the chamber does not require pumping, these evaluations should be repeated annually until pumping is necessary.

## PRETREATMENT CHAMBER INSPECTION

*A complete pretreatment chamber inspection procedure is listed below. The results of the inspection should be noted on the Service Inspection Card.*

1. If the pretreatment chamber access opening is not equipped with a riser and cover at grade, dig down to the access opening in the top of the tank. The opening is in line with the access opening for the aeration chamber and the system outlet. The access cover should not be more than 12" below grade.
2. Remove the cover and be careful not to allow dirt or mud to enter the tank.
3. Visually examine the surface of the pretreatment chamber for a significant accumulation of grease, oil or non-biodegradable materials.
4. Using the hopper scraping tool, gently probe the surface of the chamber to determine the thickness of the scum mat. Force the tool down through the scum mat, rotate the tool one quarter turn, then raise it until the bottom of the mat is felt. If the depth of the floating scum layer has reached the bottom of the discharge tee, the system should be pumped.
5. To check the depth of the settled sludge layer, secure a rough white towel to the handle of the hopper scraping tool and lower it to the bottom of the chamber.
6. Lower the tool behind the discharge tee (baffle) to avoid floating particles. Push the tool through the settled sludge layer to the bottom of the tank. Wait several minutes and carefully remove the tool. The depth of the settled sludge layer will be shown by a dark line on the towel. If the settled sludge layer has accumulated to the bottom of the discharge tee, the system should be pumped.

Review the "Operational Requirements" section of the Owner's Manual with the owner. If lint, grease, scouring pads, diapers, sanitary napkins, cotton balls, cotton swabs, cleaning rags, dental floss, strings, cigarette filters, rubber or plastic products, paints, thinning agents or other harsh chemicals are discovered in the system, the owner should be cautioned regarding proper use of the system.

## HOW TO PUMP THE HYDRO-KINETIC SYSTEM

*A complete Hydro-Kinetic system pumping procedure is listed below. Prior to tank pumping, contact the Norweco distributor to obtain complete information on equipment removal and reinstallation.*

1. If any portion of the Hydro-Kinetic system requires pumping, contact a tank pumping service licensed by the local regulatory agency. The septage or biosolids from the system must be removed and disposed of in a manner consistent with federal, state and local regulations.
2. Advise the pumping service that they will be pumping approximately 1,250 gallons for the Model 600 or approximately 1,500 gallons for the Model 600 FEU.
3. Turn off the air pump and recirculation pump 30 minutes prior to tank pumping.
4. Remove the access covers from the aeration and clarification chambers. Unplug the air pump and disassemble the union located on the primary air connection. Remove the air pump, primary air connection and concrete mounting pad from the aeration riser. Use the universal tool to bend the flexible diffuser tubing and remove the diffuser drop pipe assembly if necessary to allow access for the suction hose. If the drop pipe is not removed, use caution to insure it is not damaged during pumping. Connect the suction hose to the pump being used to evacuate the chamber.
5. Activate the pump and remove the aeration chamber contents. Pump the aeration chamber from the top down, to remove biologically inactive material. Feed the hose down as the liquid is being evacuated from the aeration chamber. It is not necessary to wash down the sidewalls or tank bottom. Pump only 75% of the volume out of the aeration chamber to facilitate plant re-start.
6. Replace the diffuser drop pipe assembly if it was removed. Reinstall the concrete mounting pad, primary air connection and air pump. Reassemble the union in the primary air connection and plug in the air pump. Replace the access cover.
7. If a Hydro-Kinetic filter is installed, it should be pumped after the aeration chamber. Remove the Hydro-Kinetic filter access cover. Lower the hose into the influent chamber until it contacts the bottom of the tank. Withdraw the hose approximately 2 inches.
8. Completely pump 100% of the contents from the chamber and rinse the media with a hose during tank pumping. Replace the Hydro-Kinetic filter access cover.
9. Next, pump the anoxic chamber. Remove the anoxic chamber access cover. Use the universal tool to bend the flexible mixing bar tubing and remove the mixing bar drop pipe if necessary to allow access for the suction hose. If the drop pipe is not removed, use caution to insure it is not damaged during pumping. Lower the hose until it contacts the bottom of the tank. Withdraw the hose approximately 2 inches.
10. Completely pump 100% of the contents from the anoxic chamber. Reinstall the mixing bar drop pipe assembly and replace the access cover.
11. The final chamber to pump is the pretreatment chamber. Remove the pretreatment chamber access cover. Break up the scum mat to facilitate pumping. Lower the hose until it contacts the bottom of the tank. Withdraw the hose approximately 2 inches.
12. Activate the pump and remove 100% of the pretreatment chamber contents. It is not necessary to wash down the sidewalls or tank bottom. If solids are so concentrated that the suction hose cannot withdraw them, tank contents may be back-flushed to break up the solid matter. Replace the access cover.
13. After pumping, refill all chambers to capacity with clean water. Return all plumbing and equipment to its proper installed location. Replace any access covers that were removed. Turn on power to the air pump and the recirculation pump.

*Following tank pumping, no other system adjustments are necessary for proper biological treatment to continue. Regular service inspections by a factory-trained Norweco service technician should be conducted to insure long term system performance.*

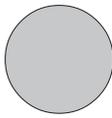
***norweco***<sup>®</sup>

*Engineering the future of water  
and wastewater treatment*

220 REPUBLIC STREET  
NORWALK, OHIO, USA 44857-1156  
TELEPHONE (419) 668-4471  
FAX (419) 663-5440  
[www.norweco.com](http://www.norweco.com)

**DISTRIBUTED LOCALLY BY:**

Norweco<sup>®</sup>, Norweco.com<sup>®</sup>, Singulair<sup>®</sup>, Modulair<sup>®</sup>, Travalair<sup>®</sup>, Singulair Green<sup>®</sup>, Ribbit Rivet<sup>®</sup>, Hydro-Kinetic<sup>®</sup>, Lift-Rail<sup>®</sup>, Microsonic<sup>®</sup>, Bio-Dynamic<sup>®</sup>, Bio-Sanitizer<sup>®</sup>, Bio-Neutralizer<sup>®</sup>, Bio-Kinetic<sup>®</sup>, Bio-Static<sup>®</sup>, Bio-Gem<sup>®</sup>, Bio-Perc<sup>®</sup>, Bio-Max<sup>®</sup>, Blue Crystal<sup>®</sup>, ClearCheck<sup>®</sup>, ChemCheck<sup>®</sup>, Tri-Max<sup>®</sup>, Hydra-Max<sup>®</sup>, Service Pro<sup>®</sup>, MCD<sup>®</sup>, TNT<sup>®</sup>, Grease Buster<sup>®</sup> and "BUSTER" logo<sup>®</sup> are registered trademarks of Norwalk Wastewater Equipment Company, Inc.



# HYDRO-KINETIC®

SYSTEM MODEL NO. \_\_\_\_\_

AIR PUMP SERIAL NO. \_\_\_\_\_

-----

## NORWECO, INC. HYDRO-KINETIC® SYSTEM LIMITED WARRANTY REGISTRATION CARD

System Model Number: \_\_\_\_\_

Air Pump Serial Number: \_\_\_\_\_

Date of Installation: \_\_\_\_\_ Installer's Name: \_\_\_\_\_

Distributed By: \_\_\_\_\_

The limited warranty for this system begins on the date of installation for the original customer. Please complete and return this card to record the system installation date. If this card is not returned to the factory, the limited warranty will begin on the original date of shipment from Norweco and you will not receive the full benefit of the limited warranty term.

\_\_\_\_\_  
(Owner's Signature)

The purchaser acknowledges that he or she has read the limited warranty for this system before signing and returning this card.

\_\_\_\_\_  
(Print Name)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(City, State, Zip Code)

\_\_\_\_\_  
(County)

Complete and mail immediately or register online at: [www.servicepromcd.com](http://www.servicepromcd.com)

-----

## HYDRO-KINETIC® SYSTEM DISTRIBUTOR SERVICE AND WARRANTY RECORD CARD

System Model Number: \_\_\_\_\_ Tank Setting Date: \_\_\_\_\_

Air Pump Serial Number: \_\_\_\_\_

Recirculation Pump Serial Number: \_\_\_\_\_

Owner Name: \_\_\_\_\_ Job Site Contractor: \_\_\_\_\_

Address: \_\_\_\_\_

(Address)

(City)

(State)

(Township)

Directions to Site and Description: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Optional Equipment: \_\_\_\_\_

Tank Location: \_\_\_\_\_ Control Location: \_\_\_\_\_

## START-UP AND INSPECTION RECORD

System Installed: \_\_\_\_\_ 18<sup>th</sup> Month: \_\_\_\_\_

System Start-Up: \_\_\_\_\_ 24<sup>th</sup> Month: \_\_\_\_\_

6<sup>th</sup> Month: \_\_\_\_\_ Send Out Service Policies On: \_\_\_\_\_

12<sup>th</sup> Month: \_\_\_\_\_ 1<sup>st</sup> Mailing: \_\_\_\_\_

(22nd Month)

2<sup>nd</sup> Mailing: \_\_\_\_\_

(23rd Month)



**HYDRO-KINETIC®  
WASTEWATER TREATMENT SYSTEM**

**OWNER RECORD OF SERVICE CALL**

Routine Service Call

Special Service Call

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Serviced By: \_\_\_\_\_

System Model No: \_\_\_\_\_

Air Pump Serial No: \_\_\_\_\_

Recirculation Pump Serial No: \_\_\_\_\_

Your Hydro-Kinetic system has been serviced as shown on the reverse side of this card. Please retain this copy for your records.

Distributed By: \_\_\_\_\_

NORWECO, INC. - NORWALK, OHIO - USA

---

**HYDRO-KINETIC®  
WASTEWATER TREATMENT SYSTEM**

**HEALTH DEPT. NOTIFICATION OF SERVICE PERFORMED**

Routine Service Call

Special Service Call

County: \_\_\_\_\_ Date: \_\_\_\_\_

Serviced By: \_\_\_\_\_

System Model No: \_\_\_\_\_

Owner Name: \_\_\_\_\_

Owner Address: \_\_\_\_\_

Service was performed on the Hydro-Kinetic wastewater treatment system listed above, as outlined on the reverse side of this card.

Distributed By: \_\_\_\_\_

NORWECO, INC. - NORWALK, OHIO - USA

---

**HYDRO-KINETIC®  
WASTEWATER TREATMENT SYSTEM**

**DISTRIBUTOR SERVICE RECORD**

Routine Service Call

Special Service Call

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Serviced By: \_\_\_\_\_

System Model No: \_\_\_\_\_

Air Pump Serial No: \_\_\_\_\_

Recirculation Pump Serial No: \_\_\_\_\_

Owner Name and Address: \_\_\_\_\_

SPECIAL NOTES: (General condition of installation regarding groundwater, grading, effluent disposal system, receiving stream, etc.) \_\_\_\_\_

NORWECO, INC. - NORWALK, OHIO - USA

**OUR SERVICE INSPECTION FOUND EQUIPMENT AND SYSTEM AS FOLLOWS:**

- Owner Not Present
- Air Pump Checked
- Controls Checked
- Flow Equalization Device Checked

- Recirculation Pump Checked
- System Piping Checked
- Hydro-Kinetic Filter Checked
- Effluent Checked

**CONDITION**

- Air Pump Operating Properly
- Controls Operating Properly
- Flow Equalization Device Operating Properly
- Recirculation Pump Operating Properly
- Hydro-Kinetic Filter Operating Properly
- Effluent Clear & Odorless

**SERVICED**

- Cleaned Diffuser
- Cleaned Mixing Bar
- Cleaned Flow Ports
- Scraped Tank Hopper
- Cleaned Bio-Film Reactors
- See Notes Below

- Your Service Policy Has Expired (Contact Local Distributor To Renew)

SPECIAL NOTES: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**OUR SERVICE INSPECTION FOUND EQUIPMENT AND SYSTEM AS FOLLOWS:**

- Owner Not Present
- Air Pump Checked
- Controls Checked
- Flow Equalization Device Checked

- Recirculation Pump Checked
- System Piping Checked
- Hydro-Kinetic Filter Checked
- Effluent Checked

**CONDITION**

- Air Pump Operating Properly
- Controls Operating Properly
- Flow Equalization Device Operating Properly
- Recirculation Pump Operating Properly
- Hydro-Kinetic Filter Operating Properly
- Effluent Clear & Odorless

**SERVICED**

- Cleaned Diffuser
- Cleaned Mixing Bar
- Cleaned Flow Ports
- Scraped Tank Hopper
- Cleaned Bio-Film Reactors
- See Notes Below

- The Service Policy Has Expired

SPECIAL NOTES: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**OUR SERVICE INSPECTION FOUND EQUIPMENT AND SYSTEM AS FOLLOWS:**

- Owner Not Present
- Air Pump Checked
- Controls Checked
- Flow Equalization Device Checked

- Recirculation Pump Checked
- System Piping Checked
- Hydro-Kinetic Filter Checked
- Effluent Checked

**CONDITION**

- Air Pump Operating Properly
- Controls Operating Properly
- Flow Equalization Device Operating Properly
- Recirculation Pump Operating Properly
- Hydro-Kinetic Filter Operating Properly
- Effluent Clear & Odorless

**SERVICED**

- Cleaned Diffuser
- Cleaned Mixing Bar
- Cleaned Flow Ports
- Scraped Tank Hopper
- Cleaned Bio-Film Reactors
- See Notes Below

- The Service Policy Has Expired

Air Pump Amperage: \_\_\_\_\_ Water Level In Plant: \_\_\_\_\_  
 Air Pump Vibration: \_\_\_\_\_ Effluent Quality: \_\_\_\_\_  
 Air Pump Voltage: \_\_\_\_\_ Plant Odor: \_\_\_\_\_

- Owner Would Like Us To Send A New Service Policy

# **HYDRO-KINETIC<sup>®</sup>**

## **WASTEWATER TREATMENT SYSTEM**

Dear Owner:

When you purchased your Norweco Hydro-Kinetic wastewater treatment system, a two year limited warranty was included in the purchase price. The purchase price also provided for a two year service inspection program at no additional cost to you.

We are pleased to be able to offer a continuing service program similar to the one originally included with your system, now that your initial service program and limited warranty have expired. Our continuing policy ranges all the way from routine inspections and emergency service to owner limitation on labor costs. We have enclosed a complete copy of our renewable service contract, with costs for your system, for your review and consideration.

We would be happy to answer any questions regarding the renewable service program or any other questions you may have regarding operation and maintenance of your Hydro-Kinetic wastewater treatment system. Please take the time to review and consider the advantages of the service contract we have enclosed. As in the past, our company also continues to offer service and repair for systems on an "as needed" basis in the area we serve. Thank you.

Sincerely yours,

Your Local Licensed Norweco Distributor

NORWECO, INC. - NORWALK, OHIO - U.S.A.

# HYDRO-KINETIC®

## OWNER PROTECTION SERVICE PROGRAM

AT NO ADDITIONAL  
OWNER EXPENSE

POSSIBLE  
EXPENSE



A. Regular service inspections as required by the local governing regulatory agency.



B. Special service inspections as requested by owner.



C. Labor and transportation expenses for travel on regular service inspections.



D. Labor and transportation expenses for travel on special service inspections.



E. Hydro-Kinetic plant maintenance including Hydro-Kinetic filter service, visual inspection of effluent quality and cleaning of hopper section using squeegee scraper in clarification tank (where applicable).



F. Inspection of outlet line or disposal system (where accessible).



G. Hydro-Kinetic air pump maintenance including cleaning of the air pump filter and diffuser assembly, power consumption check, noise check, and visual inspection for vibration of the unit while in operation.



H. Visual check of Service Pro control center for Hydro-Kinetic unit (when accessible).



I. Labor expenses required at the site to service or repair, or to remove any part of the Service Pro control center or Hydro-Kinetic air pump to be returned for factory repair.



J. Labor required at the site to service, repair or reinstall any part of the Service Pro control center or Hydro-Kinetic air pump returned from factory repair.



K. Service Pro remote monitoring service (where applicable).



L. Freight costs to and from the factory when factory repairs are needed.



M. Costs for replacing missing parts or repairing equipment.

**CONTRACT FEE \$ \_\_\_\_\_**

(To Be Paid In Advance By Owner)

**OWNER ACCEPTANCE**

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

EMAIL: \_\_\_\_\_

DATE: \_\_\_\_\_

**NORWECO HYDRO-KINETIC DISTRIBUTOR**

NAME: \_\_\_\_\_

BY: \_\_\_\_\_

DATE: \_\_\_\_\_

COMPLETE AND RETURN TO YOUR LOCAL NORWECO DISTRIBUTOR

To:

Local Dist.

Place Stamp  
Here  
Post Office Will  
Not Deliver  
Without Proper  
Postage

# ***norweco***<sup>®</sup> **HYDRO-KINETIC**<sup>®</sup> SERVICE CONTRACT

OWNER NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_ EFFECTIVE DATE: \_\_\_\_\_ 20 \_\_\_\_\_  
(street)

\_\_\_\_\_  
(city) (state) (zip) EXPIRATION DATE: \_\_\_\_\_ 20 \_\_\_\_\_

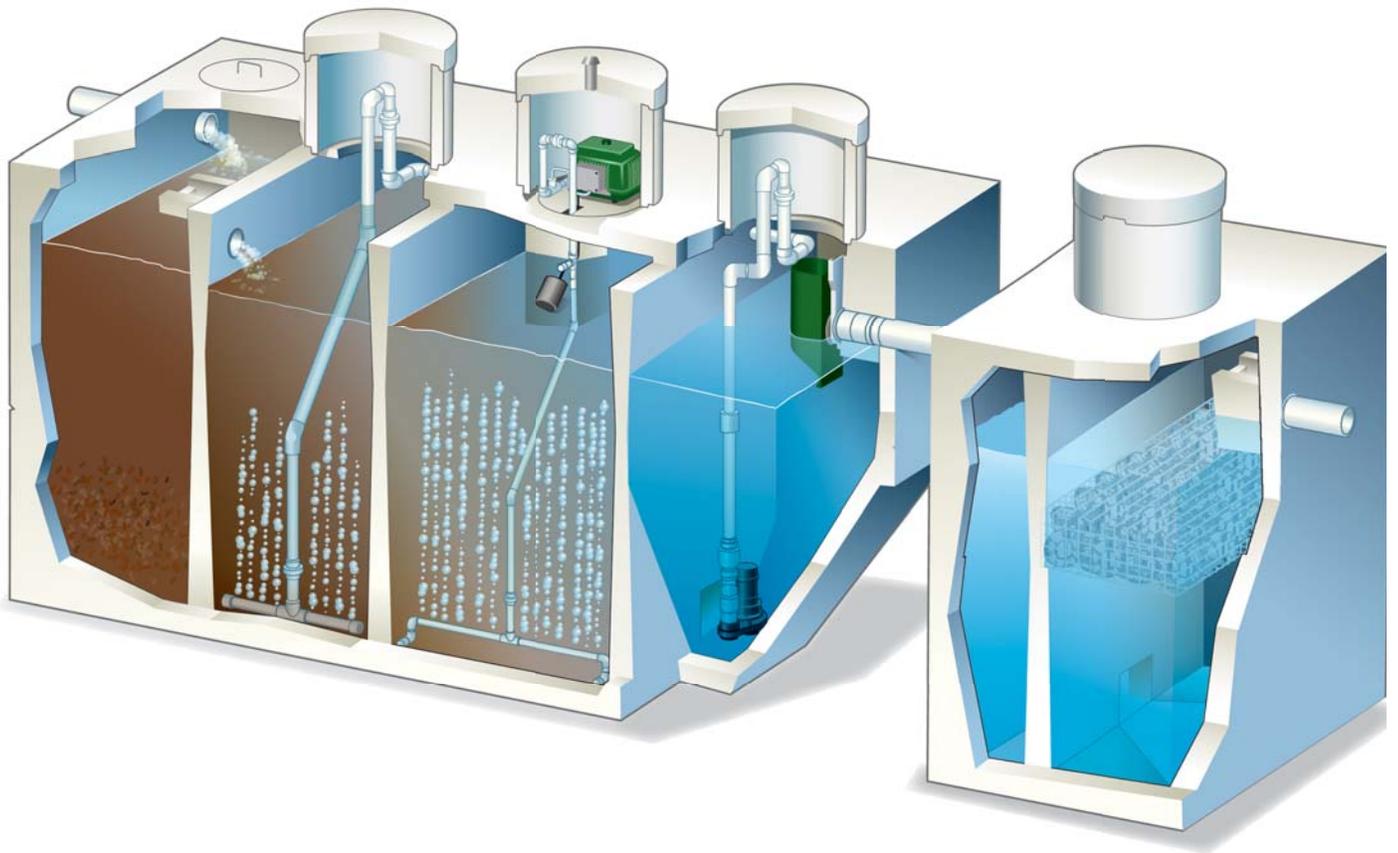
TELEPHONE NO.: ( \_\_\_\_ ) \_\_\_\_\_ SYSTEM INSTALLED ON: \_\_\_\_\_ 20 \_\_\_\_\_

DIRECTIONS: \_\_\_\_\_

This one year service contract for the Hydro-Kinetic wastewater treatment system located at the site described above, is intended to enable the owner to economically obtain regular service inspections for the Hydro-Kinetic unit, as well as non-scheduled or special service that may be required by a qualified technician. When this contract is in force, the owner will not be charged for any routine service labor. Under the terms of this service agreement, a technician will regularly inspect the plant as required by the local governing regulatory agency. It will also be inspected following each special owner service request within a 48-hour period. The contract shall remain in effect for a period of one year, as specified in the effective and expiration dates listed above.

***norweco***<sup>®</sup>  
**HYDRO-KINETIC**<sup>®</sup>

**WASTEWATER TREATMENT SYSTEM  
MODEL 600 FEU**



**INSTALLATION AND OPERATION MANUAL**

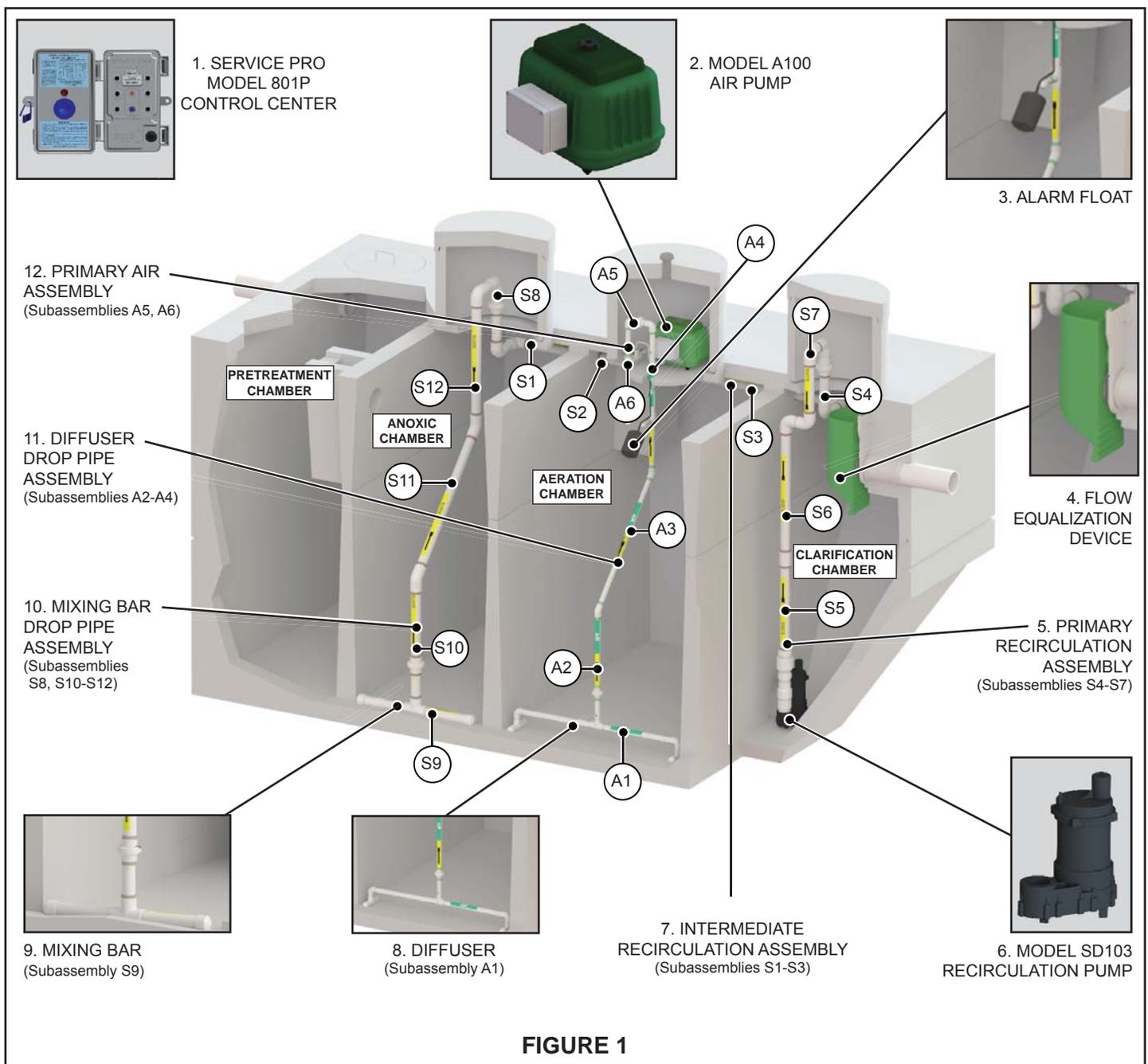
# Hydro-Kinetic® Installation and Operation Instructions

## Before You Start

Installation procedures, equipment and personnel should always comply with applicable safety regulations as well as all federal, state and local codes. The Hydro-Kinetic system must be installed according to these instructions to insure safe, reliable and efficient operation. The system must be installed by an authorized representative of Norweco. Carefully unpack and inspect the Hydro-Kinetic system components. Make sure you have received all components in good condition. Read all instructions before beginning installation.

The Hydro-Kinetic system components include:

- |   |  |
|---|--|
| 1. Service Pro Model 801P Control Center              | 7. Intermediate Recirculation Assembly |
| 2. Model A100 Air Pump (with power wire junction box) | 8. Diffuser                            |
| 3. Alarm Float (with alarm wire junction box)         | 9. Mixing Bar                          |
| 4. Flow Equalization Device                           | 10. Mixing Bar Drop Pipe Assembly      |
| 5. Primary Recirculation Assembly                     | 11. Diffuser Drop Pipe Assembly        |
| 6. Model SD103 Recirculation Pump                     | 12. Primary Air Assembly               |

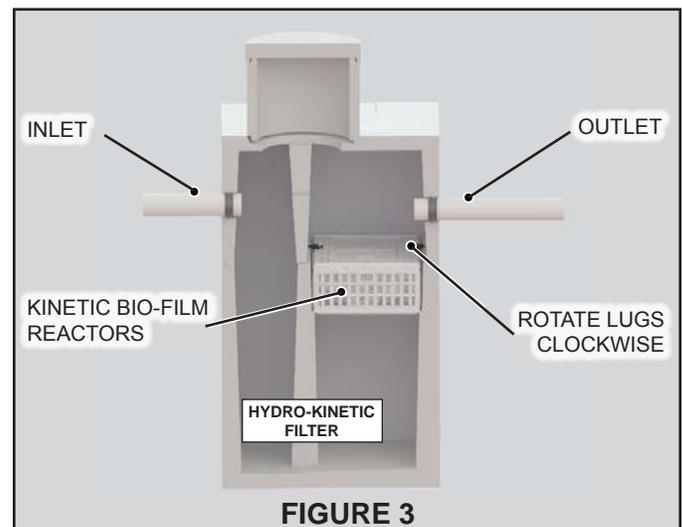
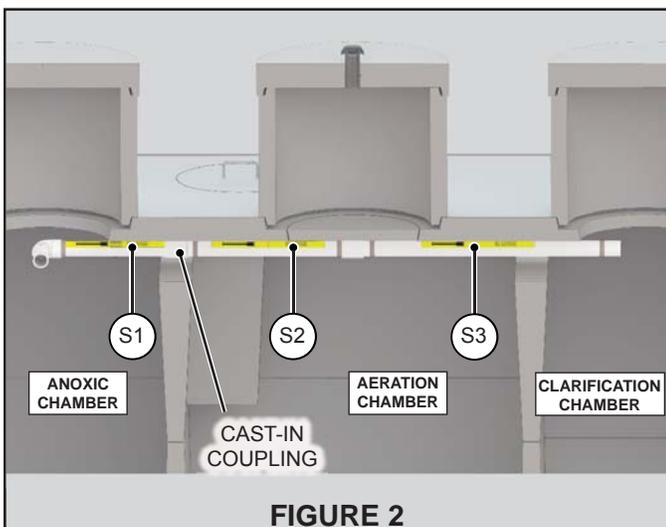


**FIGURE 1**

## Pre-Delivery Tank Preparation

The Hydro-Kinetic tank equipment package contains some components that are cast-in the tank during the manufacturing process, and other components that are installed after the casting process is complete. In the standard two-piece tank, the only component that needs to be installed prior to delivery is the intermediate recirculation assembly. In a one-piece tank, the distributor will need to provide a pretreatment outlet tee, an aeration chamber inlet elbow and a Hydro-Kinetic filter outlet tee. Norweco recommends assembling all of these components, as well as the Kinetic Bio-Film reactors, before the tank is delivered to the installation site. Install components according to the following steps:

1. For a one-piece tank, solvent weld the 4" Schedule 40 PVC pretreatment outlet tee to the coupling that was cast-in the outlet of the pretreatment chamber (distributor to provide). Solvent weld the 4" Schedule 40 PVC aeration chamber transfer elbow into the coupling cast-in the inlet of the aeration chamber (distributor to provide).
2. For all systems, begin in the anoxic chamber and solvent weld subassembly S1 into the coupling that was cast-in the wall between the anoxic and aeration chambers. The elbow should be oriented as shown in Figure 2, with the short stub of pipe parallel to the floor and ceiling of the tank.
3. Solvent weld subassembly S2 into the aeration chamber side of the same cast-in coupling. See Figure 2.
4. Starting in the aeration chamber, pass subassembly S3 through the wall into the clarification chamber. Solvent weld the coupling on subassembly S2 to subassembly S3. See Figure 2.
5. Place both Kinetic Bio-Film reactors into the Hydro-Kinetic filter. They will rest on the support rib cast into the outlet chamber. The Kinetic Bio-Film reactors should be installed with the media service hatch oriented toward the middle of the tank and facing up. See Figure 3.
6. Using the universal tool, rotate the two round lugs clockwise on each Kinetic Bio-Film reactor so that they lock into the recesses cast into the tank.



## Tank Delivery and Setting

1. When installing a Hydro-Kinetic system, first check the length, width and depth of the excavation. If installing a Model 600 FEU system, insure the excavation is long enough to allow at least 2' between the treatment tank and the Hydro-Kinetic filter for installation of the interconnect plumbing and backfill between the tanks. Cut a 4" Schedule 40 PVC pipe (distributor to provide) 6" longer than the distance between the tanks for the interconnect plumbing. Insert the interconnect pipe into the inlet of the Hydro-Kinetic filter prior to tank placement. This allows the interconnect pipe to be backed straight out, and solvent welded into the cast-in outlet coupling of the clarification chamber when the tank is set. The excavation should have sufficient overdig to allow for a minimum of 6" clearance around the entire perimeter of the system. Additional overdig will be required on deep installations or where unstable soil conditions exist. Safe working conditions must be established and maintained during the entire installation procedure.
2. Prepare the excavation to the appropriate depth based on the elevation of the building sewer line. Allow  $\frac{1}{8}$ " of fall per foot from the building to the system. Fall through the Model 600 system is 4" from inlet invert to outlet invert. In the Model 600 FEU that includes the Hydro-Kinetic filter, fall through the system is 5" from inlet invert to outlet invert. Therefore, the outlet line from the system must be installed either 4" or 5" lower than the inlet sewer line. The bottom of the excavation must be level and smooth. A 4" layer of gravel, sand or fine crushed stone should be installed and leveled to within  $\frac{1}{4}$ " from side to side and end to end.

3. Using extreme caution, place the treatment tank into the excavation. If installing a Model 600 FEU system, place the Hydro-Kinetic filter in the excavation allowing at least 2' between the treatment tank and the Hydro-Kinetic filter. Insure tanks are installed square and level.
4. Connect the building sewer line to the pretreatment chamber inlet. The inlet line must be laid continuously and unspliced from the tank to undisturbed earth beyond the limits of the tank excavation.
5. If installing a Model 600, connect the discharge sewer line to the tank outlet coupling continuously and unspliced from the tank to undisturbed earth beyond the limits of the tank excavation. Solvent weld the discharge sewer line to the tank outlet coupling.
6. If installing a Model 600 FEU, back the interconnect pipe out of the Hydro-Kinetic filter and solvent weld the pipe to the outlet coupling of the clarification chamber. Then, connect the discharge sewer line to the Hydro-Kinetic filter outlet continuously and unspliced from the tank to undisturbed earth beyond the limits of the tank excavation. If using a one-piece tank, insert discharge sewer line through tank outlet seal, leaving 4" to 6" protruding inside the tank. Solvent weld the 4" Schedule 40 PVC outlet tee (distributor to provide) to the discharge sewer line.
7. Install risers as required to bring the access covers to grade.

### **Plant Wiring and Control Center Installation**

1. Electrical work must be performed in accordance with the latest edition of the National Electrical Code as well as applicable local codes.
2. All electrical service cable used with the Hydro-Kinetic system must be UL and CSA approved, type UF, #14/2 AWG minimum and must have a full-size center ground. Larger cable is required if the length of the underground service is greater than 80 feet. Consult your electrician for details.
3. An approved cable must be installed from the air pump to the junction box provided for connection to the control center. If installing the air pump in a location other than the aeration chamber riser, insure the air line is no more than 75' in length and the air pump is protected from the elements in a clean, dry, well-ventilated area and proceed to step 6.
4. Inspect the power cable entrance in the side of the aeration riser. Remove any sharp edges or flash. Insert the free end of the power cable through a pre-formed ½" conduit ell (2' by 1'), then into the power cable entrance of the aeration riser. Guide the power cable into the riser. Pull enough cable through the riser to reach 36" above the riser top. Coil and secure the cable in the aeration riser so that it will not hang down into the tank.
5. Lay the conduit ell with cable directly across the top and down the tank side. Do not allow the power cable to be laid across the end of the tank or any removable access cover. Seal the connection between the conduit and the aeration riser with mortar or approved sealant.
6. A second underground cable must be installed unspliced from the Service Pro control center into the clarification chamber riser to supply power to the recirculation pump.
7. Inspect the power cable entrance in the side of the concrete clarification riser. Remove any sharp edges or flash. Insert the free end of the power cable through a pre-formed ½" conduit ell (2' by 1'), then into the power cable entrance of the clarification riser. Guide the power cable into the riser. Pull enough cable through the riser to reach 36" above the riser top. Coil and secure the cable in the clarification riser so that it will not hang down into the tank.
8. Lay the conduit ell with cable directly across the top and down the tank side. Do not allow the power cable to be laid across the end of the tank or any removable access cover. Seal the connection between the conduit and the clarification riser with mortar or approved sealant.
9. Two alarm leads must be installed from the air pump pressure switch to the Service Pro control center. The alarm leads should be #16 AWG minimum and installed in conduit where contact with concrete may occur. **IMPORTANT:** Alarm leads and power leads must always be installed in separate conduits.
10. Two alarm leads must be installed from the high water float switch to the Service Pro control center. The alarm leads should be #16 AWG minimum and installed in conduit where contact with concrete may occur. **IMPORTANT:** Alarm leads and power leads must always be installed in separate conduits. If the air pump will be installed in the aeration riser, the high water and air pump alarm leads should be installed in the same conduit. Properly seal the conduit opening in the riser with mortar or approved sealant.
11. Check the excavation and sewer line trenches to be sure they are free of debris, rocks, and any sharp or abrasive objects that could damage electrical cables or alarm leads during backfill or settling.

12. Uncoil the electrical service cables and alarm leads into the excavation and influent sewer line trench. Leave sufficient slack in the cables so they will not be stressed or pulled tight during backfill or settling.
13. Always encase the electrical cables and alarm leads in conduit any time they are above finished grade. Route the conduits and cables as directly as possible to the control center mounting location.

### Required Prior to Backfilling

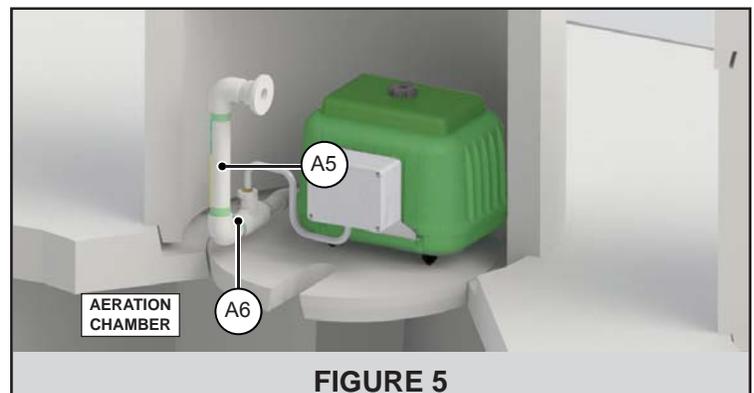
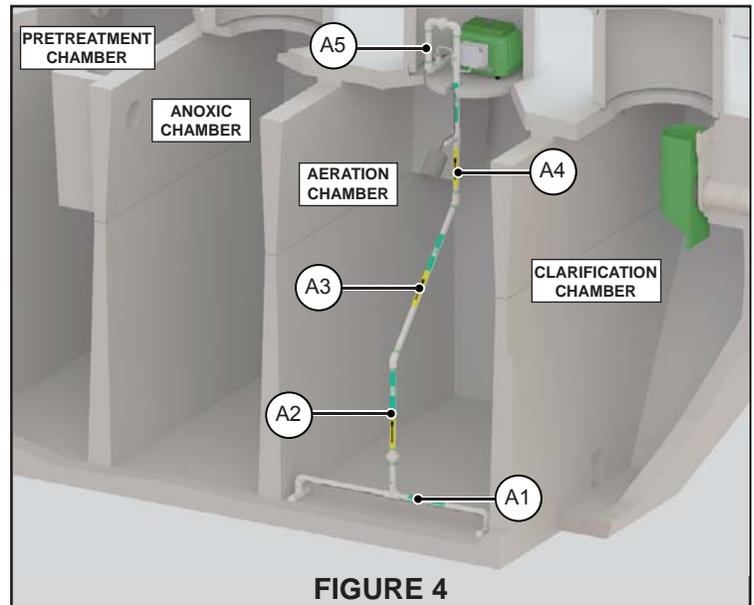
1. For installations where the air pump will not be located in the aeration riser, install a ¾" Schedule 40 PVC air line from the air pump to the system. The air line should be buried in a trench at a recommended depth of at least 12 inches. Protect the air line in a casing pipe if heavy loading is anticipated. The air line must be run into the aeration riser and the opening in the riser sealed with mortar or approved sealant.
2. On the Kinetic Bio-Film reactors, use the universal tool to insure each of the round, black locking lugs is rotated to the furthest extension point possible. Only rotate the lugs clockwise.

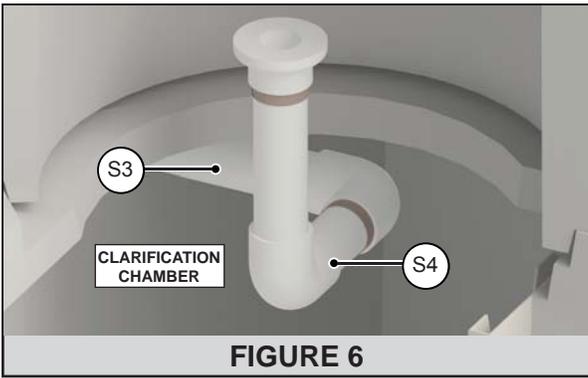
### Backfilling

1. The system should be backfilled immediately after sewer lines and underground electrical cables are installed. Fine, loose earth should be used to backfill the tank excavation and sewer line trenches. Be sure it is completely free of rocks, large clumps of earth and construction debris. Use fine granular material when backfilling around electrical cables and conduits. The underground electrical cables should have at least 2' of earth cover. If the proposed finished grade will not permit this coverage, the cables should be installed in approved conduit from the tank to the building foundation. Backfill evenly around the entire perimeter of the tank rather than all at once on each side. Take care to completely fill in the cavity beneath the slanted clarifier end wall.
2. Final grading should be 6" below the top of each access cover and should slope away from the tank so surface runoff will drain away from the treatment system. Use extreme care in backfilling. Do not allow dirt or mud to enter any part of the treatment system or sewer lines. If dirt or mud enters any portion of the system, it must be removed to insure proper system operation. Removing the dirt or mud may require repeated flushing and tank pumping.
3. Immediately after backfilling, fill each chamber of the treatment system with water to the outlet invert. The water must be free of leaves, mud, grit or any other materials that might interfere with system operation.

### Air Pump and Piping Installation

1. Remove the contents from red mesh bag with components labeled "AIR". Attach diffuser bar A1 to subassembly A2 at union as shown in Figure 4. Securely tighten union by hand.
2. Solvent weld subassembly A2 to subassembly A3 as shown in Figure 4. Insure red arrows are aligned.
3. Solvent weld subassembly A3 to subassembly A4 as shown in Figure 4. Insure blue arrows are aligned.
4. Install this entire assembly into aeration chamber by bending the flexible tubing. Lower assembly into the tank until the diffuser bar contacts both the floor and side wall of the tank as shown in Figure 4.
5. Remove air pump and components from carton. If the air pump will be installed in the aeration chamber riser, solvent weld subassembly A5 to subassembly A6 as shown in Figure 5. Insure yellow arrows are aligned. Install concrete support base for air pump.
6. Install the air pump in the aeration chamber riser on the support base (or in a clean, dry, well-ventilated area protected from the elements no more than 75' from the tank). Attach subassembly A4 to subassembly A5 at union as shown in Figure 4. Securely tighten union by hand.





**FIGURE 6**

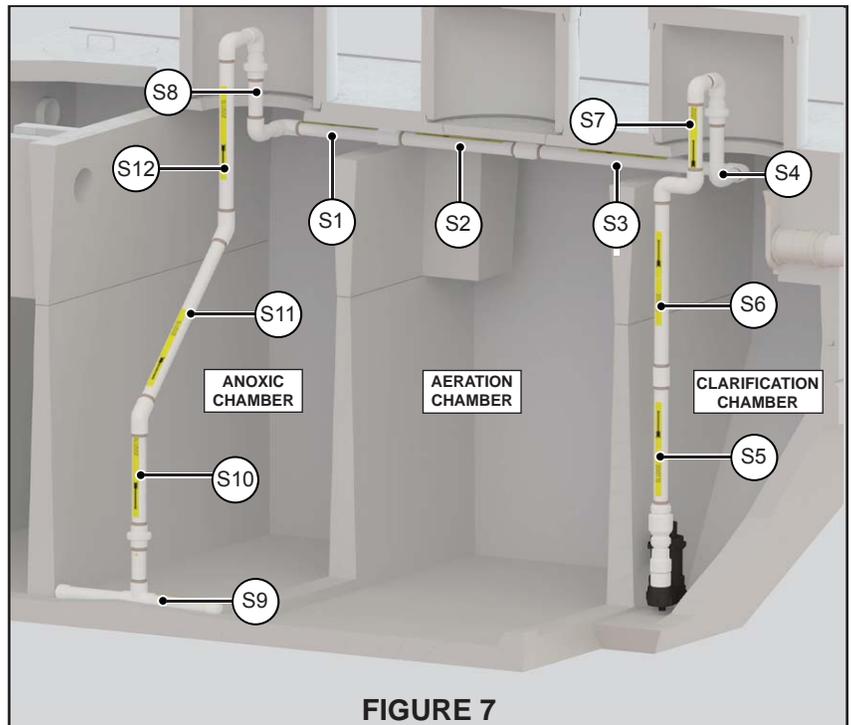
7. To wire the air pump female electrical connector, unscrew the three captive stainless steel screws from the face of the female connector. They will stay in the body of the receptacle. Lift out the rigid internal receptacle body. Unscrew the compression nut on the strain relief connector. Insert the electrical service cable through the compression nut, compression ring and neoprene grommet. Strip the outer insulation back 1¼" on the underground electrical service cable and expose the three individual leads. Use extreme care to be sure the insulation jackets on the individual black and white leads are not scarred or damaged while stripping the outer jacket.
8. Strip off the insulation jackets ¾" from the ends of the individual black and white leads. Insert the black lead into the hole adjacent to the brass-colored screw and tighten the screw securely. Insert the white lead into the hole adjacent to the silver-colored screw and tighten the screw securely. Insert the bare copper ground lead into the hole that is adjacent to the green-colored screw and tighten the screw securely. Align the insert key on the receptacle body with the keyway molded into the rubber sleeve. Press the receptacle body into the sleeve and tighten the three stainless steel screws on the face of the connector. Press the grommet into the electrical connector and tighten the compression nut.

adjacent to the brass-colored screw and tighten the screw securely. Insert the white lead into the hole adjacent to the silver-colored screw and tighten the screw securely. Insert the bare copper ground lead into the hole that is adjacent to the green-colored screw and tighten the screw securely. Align the insert key on the receptacle body with the keyway molded into the rubber sleeve. Press the receptacle body into the sleeve and tighten the three stainless steel screws on the face of the connector. Press the grommet into the electrical connector and tighten the compression nut.

## Recirculation Pump and Piping Installation

In the clarification chamber:

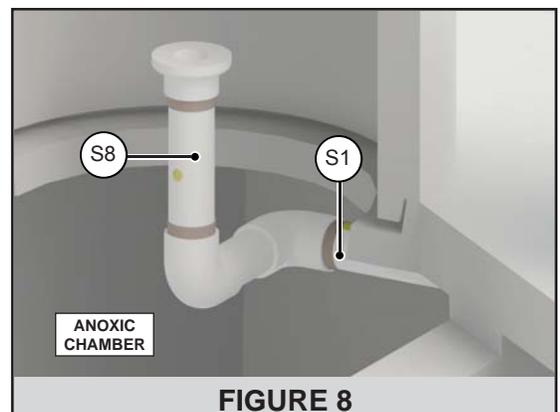
1. Remove the contents from black mesh bag with components labeled "SLUDGE". Solvent weld subassembly S3 to subassembly S4 in the clarification chamber (S3 was installed with the Tank Equipment Package). Be sure the union is facing up as shown in Figure 6.
2. Thread subassembly S5 into the pump discharge as shown in Figure 7.
3. Solvent weld the coupling on subassembly S5 to subassembly S6. See Figure 7.
4. Solvent weld subassembly S6 to subassembly S7 as shown in Figure 7.
5. Attach pump cord to pump discharge assembly (S5-S7) using cable ties provided.
6. Use discharge assembly to lower pump into the clarification chamber until pump rests on the floor of the hopper as shown in Figure 7. Attach subassembly S4 to subassembly S7 at union. Securely tighten union by hand.



**FIGURE 7**

In the anoxic chamber:

7. Solvent weld subassembly S1 to subassembly S8 (S1 was installed with the Tank Equipment Package) with union facing up as shown in Figure 8.
8. Attach subassembly S9 to subassembly S10 at union as shown in Figure 7. Securely tighten union by hand.
9. Solvent weld subassembly S10 to subassembly S11 as shown in Figure 7. Insure yellow arrows are aligned.
10. Solvent weld subassembly S11 to subassembly S12 as shown in Figure 7. Insure green arrows are aligned.
11. Bend mixing bar assembly at flexible tubing and lower into anoxic chamber until mixing bar is positioned as shown in Figure 7. Attach subassembly S12 to subassembly S8 at union. Securely tighten union by hand.



**FIGURE 8**

12. Wire the recirculation pump female electrical connector. Unscrew the three captive stainless steel screws from the face of the female connector. They will stay in the body of the receptacle. Lift out the rigid internal receptacle body. Unscrew the compression nut on the strain relief connector. Insert the electrical service cable through the compression nut, compression ring and neoprene grommet. Strip the outer insulation back 1¼" on the underground electrical service cable and expose the three individual leads. Use extreme care to insure the insulation jackets on the individual black and white leads are not scarred or damaged while stripping the outer jacket.

13. Strip off the insulation jackets ⅞" from the ends of the individual black and white leads. Insert the black lead into the hole adjacent to the brass-colored screw and tighten the screw securely. Insert the white lead into the hole adjacent to the silver-colored screw and tighten the screw securely. Insert the bare copper ground lead into the hole that is adjacent to the green-colored screw and tighten the screw securely. Align the insert key on the receptacle body with the keyway molded into the rubber sleeve. Press the receptacle body into the sleeve and tighten the three stainless steel screws on the face of the connector. Press the neoprene grommet into the electrical connector and tighten the compression nut.

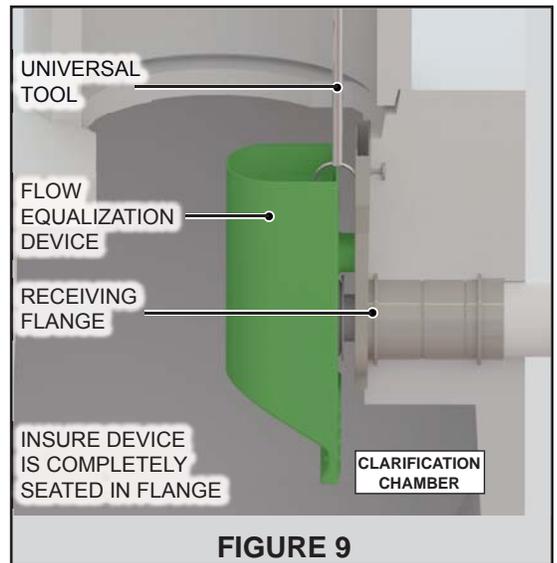


FIGURE 9

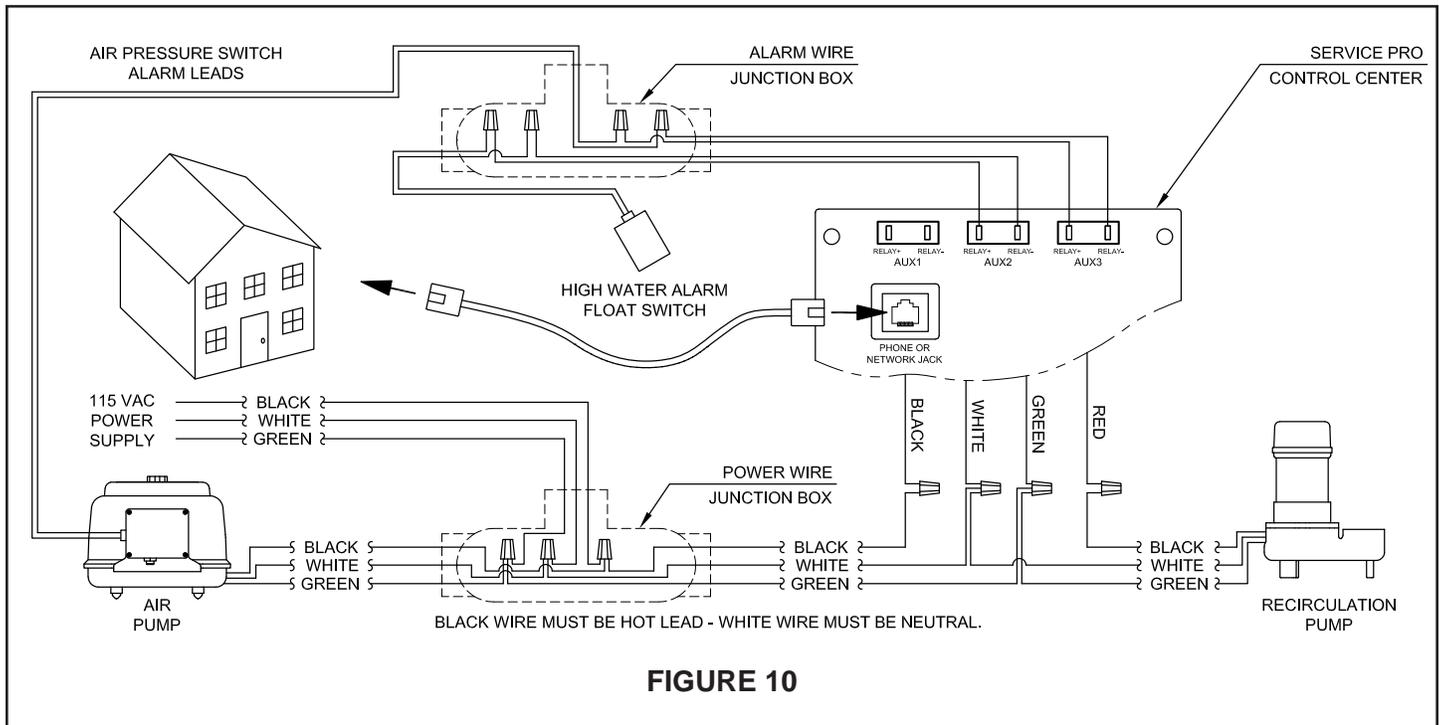
14. Plug the male connector on the recirculation pump power cord into the female connector.

15. Install the flow equalization device by sliding it into the tank receiving flange in the clarification chamber as shown in Figure 9. Use the universal tool to insure the device is completely seated in the flange.

## Completing the Installation

1. The control center should be wired for operation when the tank and underground electrical cables are installed. The control center should be located so that the red warning light can be seen and the audible alarm heard. The mounting location should minimize exposure to direct sunlight, freezing rain or conditions that might prevent routine inspection or access. The control center should always be mounted out of the reach of children.
2. Remove the cover from the alarm wire junction box connected to the float switch. Solvent weld the junction box to the conduit containing the alarm leads, located in the aeration chamber riser.
3. Reference Figure 10 for all wiring instructions. The black and white alarm wires contained in the junction box are provided to connect the float switch to the control center. Connect the black wire in the junction box to either alarm lead from the panel, and secure with a wire nut connector. Connect the white wire in the junction box to the remaining alarm lead from the panel, and secure with a wire nut connector.
4. If the air pump is installed in the aeration chamber riser, solvent weld the conduit connection for the pressure switch alarm cable to the junction box. Connect the black wire in the pressure switch cable to either alarm lead from the panel, and secure with a wire nut connector. Connect the white wire in the pressure switch cable to the remaining alarm lead from the panel, and secure with a wire nut connector.
5. Reinstall and secure the cover on the alarm wire junction box. Plug any unused junction box openings.
6. Proceed to the control center. Detach the cover from the control center enclosure and remove the insert from the mounting posts. Set the control center insert aside. Remove the knockouts in the bottom of the enclosure and install a sealed conduit connector (distributor to provide) in each opening. Exposed wiring to or from the control center should always be encased in conduit. Mount the control center securely using masonry nails, wood screws or common nails as appropriate.
7. Use a dedicated 115 VAC, single-phase circuit at the main electrical service panel. A 15 amp circuit breaker is recommended (10 amp minimum). **CAUTION: MAKE SURE THIS CIRCUIT IS DE-ENERGIZED. CHECK IT WITH AN ELECTRICIAN'S TEST LIGHT BEFORE PROCEEDING. REMEMBER THAT OTHER CIRCUITS IN THE SERVICE PANEL MAY REMAIN ENERGIZED AS YOU ARE WORKING. USE ONLY TOOLS WITH INSULATED HANDLES, STAND IN A DRY LOCATION AND WORK WITH EXTREME CARE.**
8. Open the black electrical insulator on the back of the control center insert for access to power and alarm wiring connections.
9. Install a #14/2 AWG minimum cable with full-size center ground from the control center to the power wire junction box provided for connection to the control center.

10. Wire from the dedicated circuit breaker in the main service panel to the power wire junction box. Use at least #14 AWG black copper wire. Connect the black wire from the main service panel to the black wire in the air pump power cable and the black wire to the control center. Secure with a wire nut connector.
11. Wire from the neutral in the main service panel to the junction box. Use at least #14 AWG white copper wire. Connect the white wire from the main service panel to the white wire from the air pump power cable and the white wire to the control center. Secure with a wire nut connector.
12. Connect the ground wire from the main electrical service panel to the non-insulated ground lead from the air pump and the ground wire to the control center. Secure with a wire nut connector. **IMPORTANT:** Never allow the white neutral leads and the ground leads to be spliced together.
13. Install the cover on the junction box and proceed to the control center.



14. Connect the black wire from the junction box to the black wire on the control center. Secure with a wire nut connector.
15. Connect the black lead of the underground electrical cable from the recirculation pump to the red wire on the control center. Secure with a wire nut connector.
16. Connect the white wire from the junction box to the white wire from the recirculation pump and white wire on the control center. Secure with a wire nut connector.
17. Connect the ground wire from the junction box to the non-insulated ground lead from the recirculation pump and the green wire on the control center. Secure with a wire nut connector. **IMPORTANT:** Never allow the white neutral leads and the ground leads to be spliced together.
18. An auxiliary alarm input (AUX1) is available for connection of optional equipment such as an ultraviolet disinfection system, chemical detection system or effluent pump system. Refer to the Alarm Input section in the Service Pro Model 801P Installation and Operation Instructions for details regarding the connection of auxiliary equipment.
19. Connect the alarm leads from the high water float switch to the AUX2 RELAY terminals on the control center.
20. Connect the alarm leads from the air pump pressure switch to the AUX3 RELAY terminals on the control center.
21. If the remote monitoring features of the control center will be utilized, run the telephone or network cable to the bottom of the control center enclosure. **IMPORTANT:** Never install the communication cable in a conduit with power lines.
22. Place the communication cable in the electrical grommet provided. The grommet snaps into the control center enclosure. Crimp the appropriate phone or network connector on the end of the communication cable. Plug the connector into the jack on the control center insert. Connect the other end to the telephone or network system.

23. Carefully form all wiring neatly into the lower part of the control center. Do not allow the wires to make contact with other electrical components in the control center. The conduit openings in the enclosure must now be sealed using expanding foam sealant (available from Norweco).
24. Close the black electrical insulator and snap the control center insert into position. Reinstall and close the control center cover. Secure it with the Norweco tamper evident seal.
25. Clearly label the dedicated circuit used for the Hydro-Kinetic system on the door of the main service panel. Replace the service panel deadfront and enclosure cover.

### **Final Check and System Startup**

1. Place the dedicated circuit breaker for the Hydro-Kinetic system in the main service panel in the "on" position.
2. To commission the telemetry system, first insure the phone/network cable is properly installed. Place the control center power switch in the "off" position. While holding in the reset button, place the power switch in the "on" position. Continue to hold the reset button for 5 seconds. Release the reset button and allow the telemetry system up to 60 seconds to call out and complete the commissioning process. The phone/network light will illuminate during the call out process. If commissioning is successful, the alarm light will flash 5 short flashes and stop as verification. If commissioning is unsuccessful, refer to the Service Pro Model 801P Installation and Operation Instructions.
3. If no telemetry system is installed, press and hold the RESET button on the control center for 5 seconds. The audible alarm should sound and the alarm light should illuminate.
4. The system is operational once all installation and startup steps have been completed to this point. It will take 2 to 6 weeks for the system to reach biological maturity, depending upon system loading.

### **Routine Maintenance**

The following should be performed every 6 or 12 months (depending on your state and local governing regulations) by a qualified service technician:

1. If applicable, inspect the effluent discharge point to make sure there are no restrictions to the effluent flow. If restrictions are present, perform service as needed.
2. If effluent sampling is required, it is recommended that a proper sampling port be installed downstream of the Hydro-Kinetic system.
3. Inspect the vent cap, perimeter vent and air pump for objects, plants, insects or debris that could impede the air intake. Remove these items if present.
4. Check the air pump for proper operation. Check the air filter and clean or replace as required. Check the aeration chamber for odor. A musty odor indicates the presence of aerobic conditions essential for proper treatment. A septic odor indicates inadequate aeration, suggesting that the delivery of air into the aeration chamber has been restricted.
5. Check the aeration chamber and insure the diffuser assembly is creating a rolling motion of the chamber contents. If a rolling motion is not visible, verify air pump operation. Remove and clean diffuser assembly if necessary.
6. Check the anoxic chamber and insure the mixing bar is operational. The recirculation pump operates on a pre-programmed on/off cycle, so press the reset button if necessary to verify operation.
7. Inspect the flow equalization device. Rinse the design flow, sustained flow and peak flow ports with a garden hose and insure they are free of debris. Clean the flow ports with a brush if necessary.
8. Use the hopper scraping tool to gently scrape all surfaces of the clarification chamber hopper.
9. On Model 600 FEU systems, the settled solids should be pumped from the Hydro-Kinetic filter to the pretreatment chamber. With the flow equalization device securely in place, install the outlet blocking tool into the clarifier outlet coupling prior to pumping. Place the intake of the service pump at the bottom of the influent chamber. Pump the contents from the bottom of the Hydro-Kinetic filter until the accumulated solids are withdrawn and the water level is below the bottom of the Kinetic Bio-Film reactors. Approximately 150 gallons will be removed during service. Rinse the media with a hose during tank pumping. After pumping, remove the outlet blocking tool and allow the Hydro-Kinetic filter to refill to normal operating level. Never leave the Hydro-Kinetic filter empty after pumping.
10. Inspect the system to determine if complete pumping may be required. See "System Pumping" section of this document.

11. Upon completion of the inspection, insure that all access covers are properly reinstalled. Any missing or damaged access covers should be immediately replaced. **CAUTION: MAKE SURE ALL ACCESS COVERS ARE REINSTALLED AND IN GOOD CONDITION.**
12. Approved replacement parts are available from the authorized system dealer listed on the control center cover.

## System Pumping

1. The Hydro-Kinetic system is a biological treatment device and will not require pumping as often as a septic tank. Pumping of the system will likely be required at 3 to 5 year intervals depending upon system usage, loading, and treatment requirements. If pumping is required more frequently than every 2 years, there is an operational problem with the system and it should be evaluated in greater detail.
2. If the service technician suspects that the system may require pumping, a settleable solids test should be performed on a sample from the aeration chamber. The air pump must be removed from the aeration chamber riser to perform this test.
3. Immediately after removing air pump, dip a graduated cone or other clear container into the aeration chamber to a depth of 2½ feet. Set the container on a level surface and then allow the solids to settle for 30 minutes while you complete the service inspection. Do not disturb the container during the test.
4. After 30 minutes, read the level of solids and compare it with the total liquid volume in the container. Calculate the percentage of settled solids volume (i.e. ½ full of solids equals 50%). If the settled material contains large pockets of clear liquid, estimate the volume of these pockets and reduce the settled solids reading by that amount. A settled solids reading of up to 80% indicates no adjustments are necessary. A settled solids level greater than 80% in the aeration chamber indicates excessive solids and that the system should be pumped.
5. If it is determined that pumping is required, contact a tank pumping service licensed by the local regulatory agency. The septage or biosolids from the system must be removed and disposed of in a manner consistent with federal, state and local regulations. Advise the pumping service that they will be pumping approximately 1,250 gallons for the Model 600 or approximately 1,500 gallons for the Model 600 FEU.
6. Turn off the air pump and recirculation pump before tank pumping.
7. Remove the access cover from the aeration and clarification chambers. Unplug the air pump and disassemble the union located on the primary air connection. Remove the air pump, primary air connection and support base from the aeration riser. Use the universal tool to bend flexible diffuser tubing and remove the diffuser drop pipe assembly. Connect the suction hose to the pump being used to evacuate the chamber.
8. Activate the pump and remove the aeration chamber contents. Pump the aeration chamber from the top down, to remove biologically inactive material. Feed the hose down as the liquid is being evacuated from the aeration chamber. It is not necessary to wash down the sidewalls or tank bottom. Pump only 75% of the volume out of the aeration chamber to facilitate plant re-start. Replace the diffuser drop pipe assembly. Reinstall the support base, primary air connection and air pump. Reassemble the union in the primary air connection and plug in the air pump. Replace the access cover.
9. If a Hydro-Kinetic filter is installed, it should be pumped after the aeration chamber. Remove the Hydro-Kinetic filter access cover. Lower the hose into the influent chamber until it contacts the bottom of the tank. Withdraw the hose approximately 2 inches. Completely pump 100% of the contents from the chamber and rinse the media with a hose during tank pumping. Replace the Hydro-Kinetic filter access cover.
10. Next, pump the anoxic chamber. Remove the anoxic chamber access cover. Use the universal tool to bend flexible mixing bar tubing and remove the mixing bar drop pipe to allow access for the suction hose. Lower the hose until it contacts the bottom of the tank. Withdraw the hose approximately 2 inches. Completely pump 100% of the contents from the chamber. Reinstall the mixing bar drop pipe assembly and replace the access cover.
11. The final chamber to pump is the pretreatment chamber. Remove the pretreatment chamber access cover. Break up the scum mat to facilitate pumping. Lower the hose until it contacts the bottom of the tank. Withdraw the hose approximately 2 inches. Activate the pump and remove 100% of the chamber contents. It is not necessary to wash down the sidewalls or tank bottom. If solids are so concentrated that the suction hose cannot withdraw them, tank contents may be backflushed to break up the solid matter. Replace the pretreatment chamber access cover.
12. After pumping, refill all chambers to capacity with clean water. Return all plumbing and equipment to its proper installed location. Replace any access covers that were removed. Turn on power to the air pump and the recirculation pump. Check for proper operation of all equipment.

## Troubleshooting

This troubleshooting section provides efficient solutions to the most common problems encountered in the operation of the Hydro-Kinetic system.

### Control Center Alarming

1. **Liquid in tank at level of high water alarm float:** system is flooded due to an obstruction in the flow equalization device, outlet, effluent line or disposal field. Determine cause and remove obstruction, or make repairs as required. Be sure to check effluent disposal system for proper operation.
2. **No rolling action in aeration chamber:**
  - Air pump is pumping air but there is an obstruction in the line between the air pump and diffuser: disassemble air line and remove obstruction.
  - Diffuser is plugged: remove and clean diffuser.
  - Air pump is not running: check power supply to air pump.
  - Air is escaping through a leak in the plumbing assembly between air pump and diffuser: identify and repair air leak. If necessary, remove the diffuser, diffuser drop pipe assembly, and primary air assembly from the aeration chamber and use a soapy water solution to thoroughly coat the plumbing and check for bubbles. Repair any leaking air pipe or fitting and retest.
3. **Air pump is running but does not pump air:** clean or replace air filter. Internal components are worn and the air pump is failing. Rebuild or replace the air pump. Contact the authorized Norweco representative for replacement components.
4. **No mixing action in anoxic chamber:**
  - Recirculation pump is operating but there is an obstruction in the line between the recirculation pump and mixing bar: disassemble mixing bar plumbing and remove obstruction.
  - Mixing bar is plugged: remove and clean mixing bar.
  - Check valve is stuck in closed position: repair or replace check valve.

### Septic Odor from System

1. **No power to air pump:** check air pump for proper operation. Insure the breaker is in the "on" position, the air pump is plugged in and power is present (check with test light from Tool Kaddy).
2. **Insufficient air delivery to aeration chamber:** see "Control Center Alarming".
3. **Incomplete treatment due to hydraulic overloading:** see "Hydraulic Overloading of System".
4. **Water softener backwash discharging into system:** notify owner to remove backwash line from system.
5. **Excessive solids in aeration chamber:** evaluate chamber and pump if necessary.
6. **Excessive solids in anoxic chamber:** evaluate chamber and pump if necessary.

### Hydraulic Overloading of System

1. **Ground water entering tank through defective inlet or outlet seal:** excavate and repair seal.
2. **Ground water entering system through crack in tank:** excavate and repair crack with hydraulic cement.
3. **Ground water entering system through joint between riser and tank:** excavate and reseal joint with non-shrink grout or mastic.
4. **Roofing down spouts, footer drains or floor drains tied into system:** notify owner to relocate connection downstream of system.
5. **Check valve is stuck in closed position:** repair or replace check valve.

**PROGRESS THROUGH**

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**SERVICE SINCE 1906**

# ***norweco***® **HYDRO-KINETIC**®

## **WASTEWATER TREATMENT SYSTEM TAKING THE ORDER**

Each Hydro-Kinetic wastewater treatment system is sold complete including: delivery and installation of the tank; installation and start-up of the air pump, recirculation pump and control center; and two-year limited warranty with prescheduled service inspections as required by local regulations. It is important that the Hydro-Kinetic order be taken and recorded carefully to insure that all federal, state and local regulations are met. A clear outline of responsibilities when the order is taken will simplify installation of the system and establish a sound working relationship with your customer and local health department.

### **INSTALLATION PROCEDURE**

Installation of the Hydro-Kinetic system normally occurs in two phases. First, the precast concrete tankage is delivered and installed at the contractor's convenience. The electrical control center and underground electrical service cables are also installed at this time. Only when the system is ready for start-up are the air pump and recirculation pump delivered and installed. When the Hydro-Kinetic installer has completed equipment installation, he should also start-up and test the entire system and familiarize the owner with its operation. This installation procedure will assure efficient use of the contractor's and installer's time and protect equipment from possible damage or unauthorized start-up.

### **CONTACT THE LOCAL HEALTH DEPARTMENT**

The contractor must contact the local health department prior to installation of the Hydro-Kinetic system and apply for an installation permit. The local distributor will have drawings, specifications and performance data for the system on file with the health department. Normally, the contractor will not be required to supply this information to receive the installation permit. The health department may request a drawing showing the proposed method of effluent disposal and location of the Hydro-Kinetic system in relation to the building, property lines and potable water supply. The health department may wish to inspect the site and proposed point of discharge, take soil samples or run percolation tests before issuing an installation permit. The contractor must find out if an inspection of the Hydro-Kinetic tank and sewer line will be required before backfilling is allowed.

### **DELIVERY TRUCK ACCESSIBILITY**

Inform the contractor of the dimensions and weight of the delivery truck. The excavation must be accessible without interference from trees, shrubbery, power lines or other obstacles. Earth from the excavation must be piled outside the working area needed to operate the truck. Remind the contractor that extra charges will apply if the excavation is not complete and readily accessible.

### **EXCAVATION SIZE AND DEPTH**

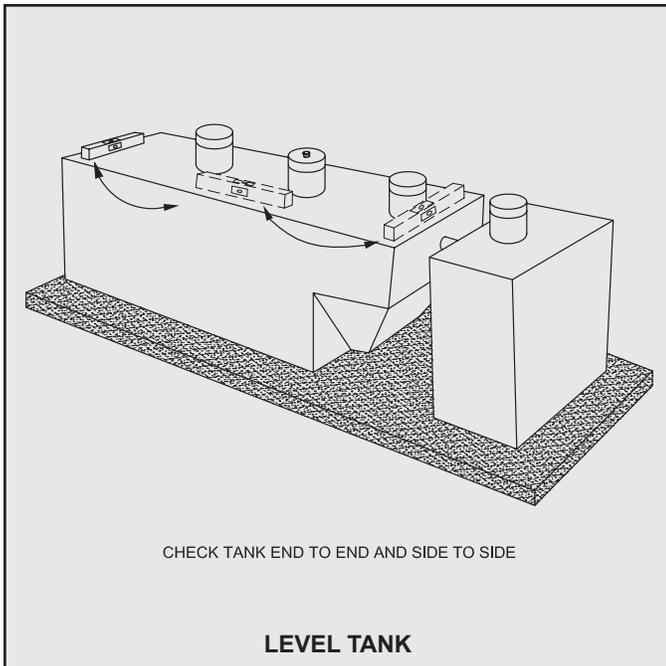
When installing a Hydro-Kinetic system, first check the length, width and depth of the excavation. If installing a Model 600 FEU system, insure the excavation is long enough to allow at least 2' between the treatment tank and the Hydro-Kinetic Bio-Film Reactor for installation of the interconnect plumbing and backfill between the tanks. The distributor must provide a 4" Schedule 40 PVC pipe cut 6" longer than the distance between the tanks for the interconnect plumbing. Insert the interconnect pipe into the inlet of the Hydro-Kinetic Bio-Film Reactor prior to tank placement. This allows the interconnect pipe to be backed straight out, and solvent welded into the cast-in outlet coupling of the clarification chamber when the tank is set. The excavation should have sufficient overdig to allow for a minimum of 6" clearance around the entire perimeter of the system. Additional overdig will be required on deep installations or where unstable soil conditions exist. Always maintain safe working conditions during the installation procedure.

The excavation depth must be calculated using several factors. First, note the elevation of the sewer line as it leaves the building. From this sewer line elevation, subtract  $\frac{1}{8}$ " per foot from the building to the system location. Next, subtract the dimension from the outside bottom of the tank to the inlet invert of the system. This dimension is 5' 0" when installing a standard Hydro-Kinetic concrete tank and 4' 0" when installing a low profile Hydro-Kinetic concrete tank. Fall through the Model 600 system is 4" from inlet to outlet invert. In the Model 600 FEU that includes the Hydro-Kinetic Bio-Film Reactor, fall through the system is 5" from inlet to outlet invert. Therefore, the outlet line from the system must be installed either 4" or 5" lower than the point where the inlet sewer line joins the system.

### **TANK LEVELING PAD**

To insure that the tank bottom will be bearing the weight evenly, all tanks should be set on a four inch thick pad of gravel, sand or fine crushed stone. The pad should be installed and leveled by the contractor before delivery and setting of any tank takes place. The tank pad must be leveled to within  $\frac{1}{4}$ " from side to side and end to end.

## TAKING THE ORDER (Cont.)



### BACKFILLING THE TANKAGE

**CAUTION:** Do not allow dirt, debris or other material to enter the Hydro-Kinetic system during installation or backfilling. The Hydro-Kinetic system must be backfilled immediately after installation. Any fine, granular jobsite material or backfill may be used. Large clumps of earth, rocks or debris should never be used to backfill around the system. The slanted endwall beneath the clarifier must be backfilled with particular care. Be sure it is completely backfilled so that future settling will not cause a low spot in the finished lawn or place an undue strain on the outlet line.

### FILLING THE SYSTEM WITH WATER

The Hydro-Kinetic system should be filled with clean water immediately after installation. Water should be added as the tank is being backfilled to equalize internal and external tank pressure. Fresh water is preferred but water from a nearby pond may be used if it is free of silt and other debris. Never use a septic tank pumping service to fill the Hydro-Kinetic system. If this is done, large amounts of biologically untreatable materials may be deposited in the system and they could interfere with system operation and performance.

### INLET SEWER LINES

Only domestic wastewater must be allowed to enter the Hydro-Kinetic system. It is not intended to handle flows from roofing down spouts, basement footer drains, sump pump piping or garage and basement floor drains. If the sanitary sewer system must be used for disposal of these liquids, it must be connected downstream of the system. Water softener backwash will affect system performance and must not flow into the Hydro-Kinetic system.

### EFFLUENT DISPOSAL LINE

Due to the high level of treatment provided by the Hydro-Kinetic system, its effluent may be discharged in a number of acceptable fashions. There must be a ground water relief point installed in the discharge line that provides an outlet no higher in elevation than the outlet invert of the Hydro-Kinetic tank. This will prevent tank contents from backing up when the normal discharge point is temporarily under water or the effluent disposal field is saturated.

### ELECTRICAL POWER SUPPLY

A dedicated 115 volt AC single-phase, 10 amp (minimum) 60 Hertz circuit must be provided in the main electrical service panel for the Hydro-Kinetic system.

### FINISH GRADING AND LANDSCAPING

A precast concrete aeration chamber riser with vented cover is provided for the air pump and extends 19" above the top of the tank. The top of each cover must project a minimum of 6" above finished grade. Individual precast concrete riser castings may be added in 12" increments when necessary. Determine if riser sections will be needed before tank installation is scheduled.

A precast concrete riser casting with non-vented cover is provided for the anoxic and clarification chambers. The top of each cover must project a minimum of 6" above finished grade. Individual precast riser castings may be added in 12" increments. Determine if riser sections will be needed before tank installation is scheduled.

### PRETREATMENT CHAMBER ACCESS

Normally, the removable cover in the tank top is all that will be needed for pretreatment chamber access. On deeper installations, the removable cover in the tank top must always be developed to within twelve inches of grade. Some owners and regulatory officials require that access to the pretreatment chamber must be at finished grade. This should be determined when the order is taken so the appropriate riser castings and covers may be delivered.

### SCHEDULING TANK DELIVERY

When all points have been fully explained, find out the customer's preferred installation date and make preliminary scheduling with your dispatcher. Take the customer's telephone number to confirm tank delivery.

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# ***norweco***® **HYDRO-KINETIC**®

## WASTEWATER TREATMENT SYSTEM

### TANK DELIVERY AND SETTING

To insure that all work proceeds safely and efficiently, check these items prior to delivery of the Hydro-Kinetic tankage.

- ✓ Does the driver have complete and accurate directions to the installation?
- ✓ Does the driver have the Hydro-Kinetic installer's tool kit?
- ✓ Is all equipment in good condition?
- ✓ Are the appropriate number of riser castings, extension riser castings and vented and non-vented access covers included?
- ✓ Is sufficient leveling material available for the bottom of excavation?
- ✓ Is there an adequate supply of sealing material for the tank and all plumbing connections?
- ✓ Does the truck have the proper pick-up bar and cable (or chain)?
- ✓ Is the proper Service Pro control center available for delivery with the tank?
- ✓ Is there sufficient underground electrical cable to reach from the control center location to the tank?
- ✓ Is there sufficient air line to reach from the air pump location to the aeration riser if air pump is to be mounted remotely?
- ✓ Is the intermediate recirculation assembly included with the delivery?

**PLEASE NOTE:** *The Hydro-Kinetic tank is constructed of monolithic castings and, if possible, the joints should be sealed at your plant before setting. This will minimize tank loading, unloading and setting time at the site. The castings may be set individually and sealed at the site if necessary. These instructions are written as if the castings will be installed separately and sealed at the site. However, the tank should be assembled and sealed in your plant if your tank handling and delivery equipment will allow it. Otherwise, proceed with tank setting as outlined herein.*

#### BEFORE YOU START

Installation procedures, equipment and personnel should always comply with applicable safety regulations as well as all federal, state and local codes. The Hydro-Kinetic system must be installed according to these instructions to insure safe, reliable and efficient operation. The system must be installed by an authorized representative of Norweco.

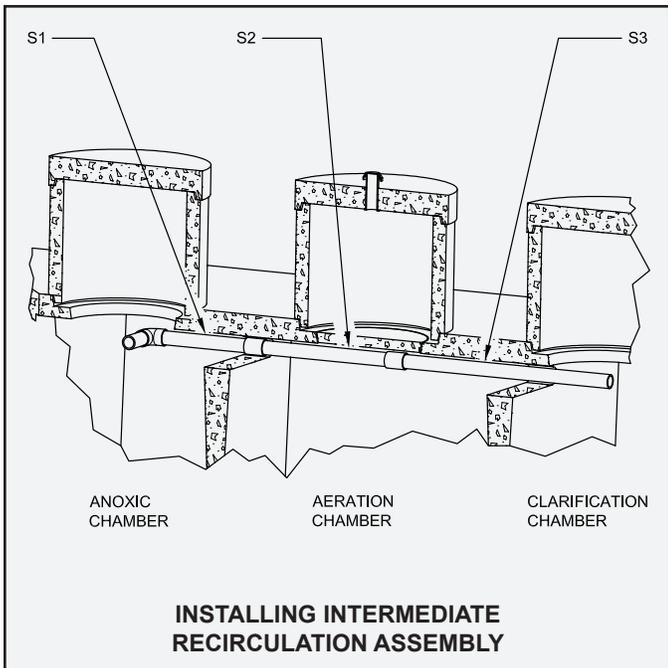
The Hydro-Kinetic system components include:

1. Service Pro Model 801P Control Center
2. Model A100 Air Pump
3. Alarm Float
4. Flow Equalization Device
5. Primary Recirculation Assembly
6. Model SD103 Recirculation Pump
7. Intermediate Recirculation Assembly
8. Diffuser
9. Mixing Bar
10. Mixing Bar Drop Pipe Assembly
11. Diffuser Drop Pipe Assembly
12. Primary Air Assembly
13. Hydro-Kinetic Bio-Film Reactor Elements

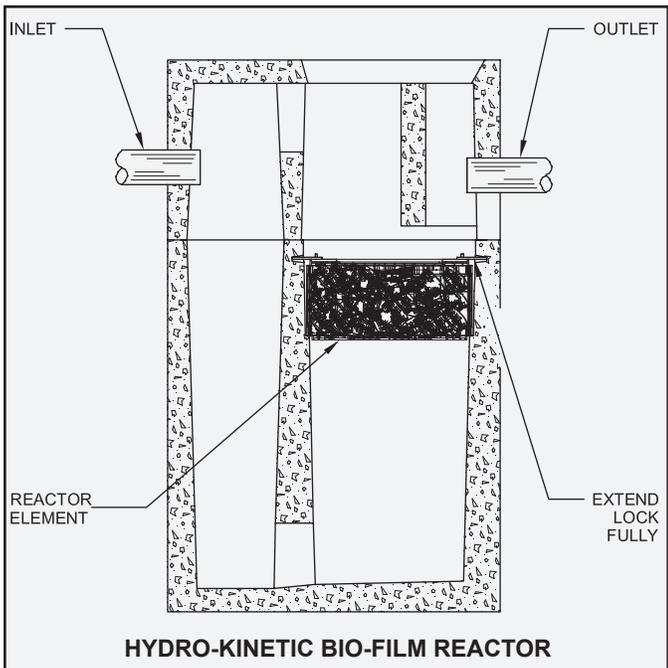
#### PRE-DELIVERY TANK PREPARATION

The Hydro-Kinetic tank equipment package and Bio-Film Reactor Elements should be installed before the system is delivered to the installation site. This allows for more consistent working conditions inside of the tank. Some components of the tank equipment package will be cast-in during the manufacturing process, and other components will be installed after the casting process is complete. The components of the Hydro-Kinetic tank equipment package that will be cast-in the tank include a through-wall pipe coupling, a clarification outlet coupling and a vent for the aeration riser cover. The remainder of the tank equipment package consists of subassemblies S1, S2 and S3, which are installed after casting is complete. Certain tanks, such as one-piece castings and Singulair tanks that have been converted to Hydro-Kinetic, require additional equipment to be installed before delivery to the installation site. For these tanks, the distributor must provide and install outlet tees for the pretreatment chamber and the Hydro-Kinetic Bio-Film Reactor, and an inlet elbow for the aeration chamber. All other tank configurations have these components integrated into the castings.

## TANK DELIVERY AND SETTING (Page 2 of 6)



For a one-piece tank and Singulair conversions, solvent weld the 4" Schedule 40 PVC pretreatment outlet tee to the coupling that was cast-in the outlet end of the pretreatment chamber (distributor to provide). Solvent weld the 4" Schedule 40 PVC aeration chamber transfer elbow into the coupling cast-in the inlet of the aeration chamber (distributor to provide). When installing the intermediate recirculation assembly for all systems, begin in the anoxic chamber and solvent weld subassembly S1 into the coupling that was cast-in the wall between the anoxic and aeration chambers. The elbow should be oriented as shown with the short stub of pipe parallel to the floor and ceiling of the tank. Solvent weld subassembly S2 into the aeration chamber side of the same cast-in coupling.



Starting in the aeration chamber, pass subassembly S3 through the wall into the clarification chamber. Solvent weld subassembly S3 to the coupling on subassembly S2.

Carefully place both Reactor Elements into the Hydro-Kinetic Bio-Film Reactor. They will rest on the ledge cast into the outlet chamber of the Hydro-Kinetic Bio-Film Reactor. The Reactor Elements should be installed with the media service hatch oriented toward the middle of the tank and facing up. Using the universal tool, slide the locking mechanisms outward on each Reactor Element so that they lock into the recesses cast into the tank.

### CHECKING THE EXCAVATION

When installing a Hydro-Kinetic system, first check the length, width and depth of the excavation. If installing a Model 600 FEU system with a separate Hydro-Kinetic Bio-Film Reactor, insure the excavation is long enough to allow at least 2' between the treatment tank and the Hydro-Kinetic Bio-Film Reactor for installation of the interconnect plumbing and backfill between the tanks. If installing a separate pretreatment tank, insure the excavation is long enough to allow at least 2' between the pretreatment and anoxic chambers for installation of the interconnect plumbing and backfill between the tanks. Cut a 4" Schedule 40 PVC pipe (distributor to provide) 6" longer than the distance between the tanks for the interconnect plumbing. Insert the interconnect pipe into the inlet of the Hydro-Kinetic Bio-Film Reactor prior to tank placement. This allows the interconnect pipe to be backed straight out and solvent welded into the cast-in outlet coupling of the clarification chamber when the tanks are set. The excavation should have sufficient overdig to allow for a minimum of 6" clearance around the entire perimeter of the system. Additional overdig will be required on deep installations or where unstable soil conditions exist. Safe working conditions must be established and maintained during installation.

Prepare the excavation to the appropriate depth based on the elevation of the building sewer line. Allow  $\frac{1}{8}$ " of fall per foot from the building to the system. Fall through the Model 600 system is 4" from inlet invert to outlet invert. In the Model 600 FEU that includes the Hydro-Kinetic Bio-Film Reactor, fall through the system is 5" from inlet invert to outlet invert. Therefore, the outlet line from the system must be installed either 4" or 5" lower than the inlet sewer line. No additional fall between the clarification chamber and Hydro-Kinetic Bio-Film Reactor is required.

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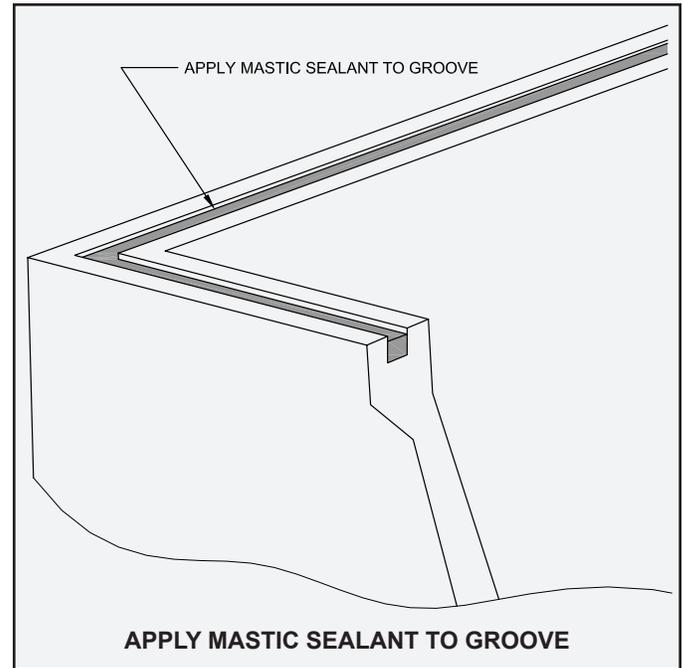
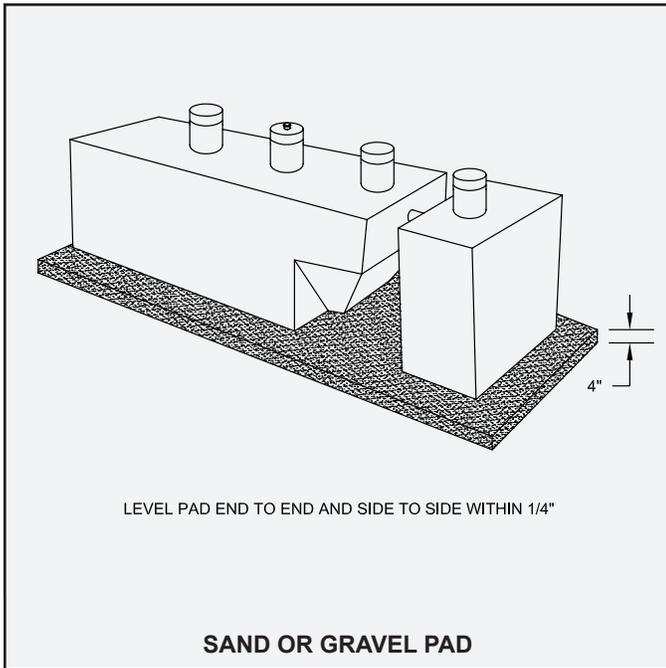
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# HYDRO-KINETIC®

## WASTEWATER TREATMENT SYSTEM

### TANK DELIVERY AND SETTING (Page 3 of 6)



#### TREATMENT TANK SETTING AND SAFETY

A tank leveling pad should be installed in the bottom of the excavation. The pad should be a minimum of 4" thick and leveled to within 1/4" from side to side and end to end. The elevation of the top of the leveling pad should correspond to the outside bottom of the Hydro-Kinetic precast concrete tankage when installed. Be sure that the height from the top of the leveling pad to grade will allow for the correct influent and effluent line connections.

With the delivery truck in position at the excavation, make sure that its outriggers are firmly placed on stable soil. All personnel must be out of the excavation and a safe distance from the tank. Before lifting the treatment tank, check all lifting chains to be sure they are properly seated in the casting pick-up grooves. Lift the tank bottom section and place it directly into the excavation. Do not set it down. Stop the casting several inches above the excavation floor and position it in the desired location. Then lower it carefully until all tension is off the lifting cable or chain.

Extreme care should be used any time personnel or equipment are in the vicinity of any excavation. A delivery truck can place excessive loading on excavation sidewalls and care must be taken in its positioning. Unstable soil conditions require constant monitoring of the site to insure safety. Construction and installation procedures, equipment, tools, materials and personnel should always comply with applicable safety regulations and federal, state and local codes.

Place a level on the exposed joint and check the casting for level from end to end and side to side (if the tank is set as one piece, check for level on the top). It must be level within 1/4" from end to end and from side to side. The casting may need to be raised slightly so additional leveling pad material can be applied before level is achieved. If the casting needs to be raised more than six inches to apply leveling material, personnel should move to a safe location so the casting can be fully returned to the bed of the delivery truck. The casting should then be reset after the excavation has been properly leveled.

#### HYDRO-KINETIC TANK SEALING

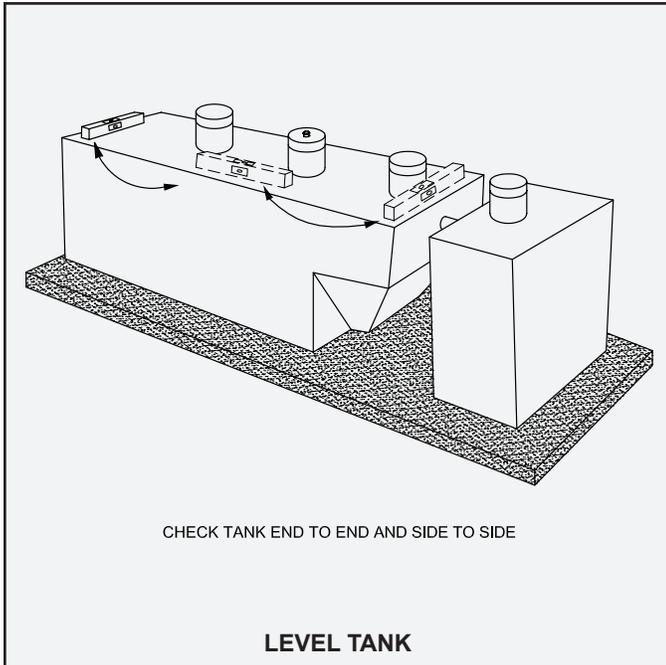
While the tank bottoms are still on the delivery truck, remove any concrete chips, stones, mud or debris from the groove in the castings and from the floor of the pretreatment, anoxic and aeration chambers. Be sure the transfer ports are clean and unrestricted. Apply a good quality mastic sealant into the groove of the bottom casting around the entire perimeter and fully across all internal baffles. Inspect the sealant after application to eliminate any gaps or uneven spots. A non-shrinking grout sealant may be used in place of mastic, but mastic will allow the tank to be filled with water immediately after its installation.

The top casting may now be set. Remove all debris from the bottom of the casting along the tongue sealing section. Do not reach or get under any portion of the casting. Carefully position the top and lower one corner into the groove. Align the sides of the casting and lower the top into position. Recheck the tank for level from side to side and end to end.

## TANK DELIVERY AND SETTING (Page 4 of 6)

### ACCESS RISER AND OPTIONAL EXTENSION RISER INSTALLATION

Locate the power cable entrance in the aeration chamber riser casting. It should be inspected for flash or sharp edges. Be sure it extends all the way through the casting side wall. Remove the cast-in access cover from the top of the aeration chamber. Apply a strip of mastic sealant around the perimeter of each access opening. Position and install the aeration mounting casting with the power cable entrance facing the tank side wall that is closest to the building. Be sure that the mounting casting is properly seated on the tank top and evenly sealed with mastic. If extension riser castings are required, install them as needed above the aeration chamber riser casting. Apply mastic sealant to all joints between castings. Do not apply sealant to the top riser that will receive the vented access cover. The anoxic chamber and Hydro-Kinetic Bio-Film Reactor have both above grade risers and below grade access openings. None of the access covers on these chambers are to be vented.



### MODEL 600 FEU BIO-FILM REACTOR SETTING

Allow Hydro-Kinetic at least 2' between the treatment tank and the Bio-Film Reactor. Lift the bottom section and place it in the excavation. Do not set it down. Stop the casting several inches above the excavation floor and position it in the desired location. Lower it carefully until all tension is off the lifting cable or chain.

Place a level on the exposed joint and check the casting for level from end to end and side to side (if the tank is set as one piece, check for level on the top). It must be level within  $\frac{1}{4}$ " from end to end and from side to side. The casting may need to be raised slightly so additional leveling pad material can be applied before level is achieved. If the casting needs to be raised more than six inches to apply leveling material, personnel should move to a safe location so the casting can be fully returned to the bed of the delivery truck. The casting should then be reset after the excavation has been properly leveled. Once level, apply mastic sealant into the groove of the bottom casting around the entire perimeter and fully across all internal baffles.

Prior to lifting the top casting, insert the interconnect piping into the inlet of the Bio-Film Reactor casting far enough to allow clearance between the clarification chamber and the Bio-Film Reactor. The interconnect piping will be backed out and solvent welded to the clarification chamber outlet coupling after the top casting is installed.

The top casting may now be set. Remove all debris from the bottom of the casting along the tongue sealing section. Do not reach or get under any portion of the casting. Carefully position the top and lower one corner into the groove. Align the sides of the casting and lower the top into position. Recheck the tank for level.

On the Bio-Film Reactors, use the universal tool to insure each of the locking mechanisms is fully engaged. Slide the locking mechanisms outward until they clear the locking ledge. Apply mastic sealant to all joints between castings on these chambers and install risers and access openings.

The pretreatment chamber can be made accessible at grade or left below grade, as required by local regulation or owner preference. The inspection cover on the pretreatment chamber must at least be developed to within twelve inches of finished grade. Pretreatment chamber access covers should never be vented and should be sealed with mastic. Be sure all cast-in access opening covers that are not extended to grade are properly aligned, seated and securely in place. Tank covers which have been replaced by mounting castings should be returned to your plant with the delivery truck. Install all covers for risers and inspection ports before backfilling begins.

### SEWER LINE INSTALLATION

Sewer lines may be installed as soon as the Hydro-Kinetic concrete tankage has been leveled and sealed. Sewer line trenches must be smoothly excavated and free of debris or sharp objects that could damage the installation. The trenches must allow sewer lines to be laid with  $\frac{1}{8}$ " of fall per linear foot of run along the entire length of the line. Influent and effluent sewer lines must be at least 4" in diameter. Connect the building sewer line to

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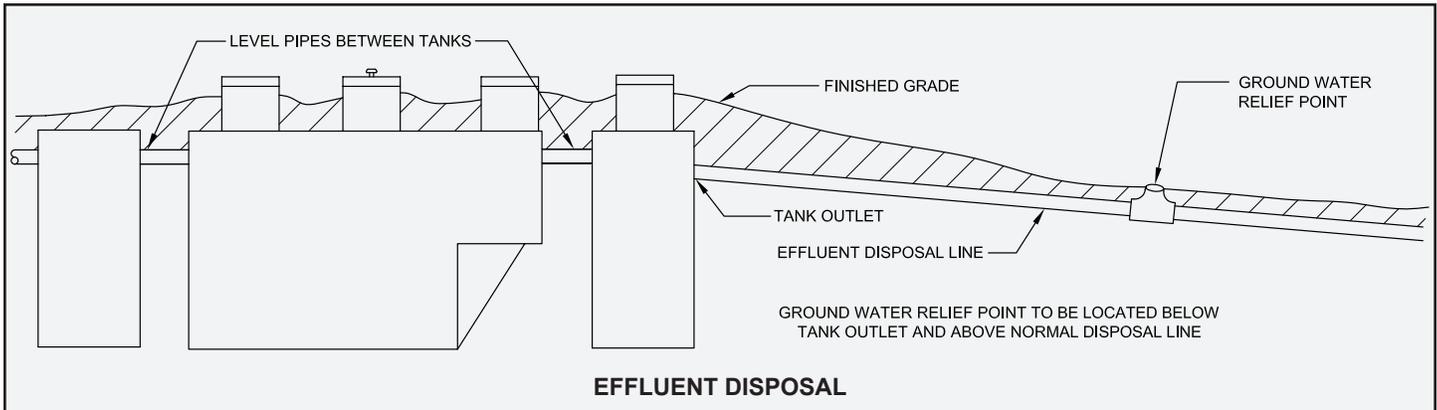
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# HYDRO-KINETIC®

## WASTEWATER TREATMENT SYSTEM

### TANK DELIVERY AND SETTING (Page 5 of 6)



the pretreatment chamber inlet. The effluent line should be PVC pipe, solvent welded into the clarification chamber outlet coupling. If installing a Model 600 FEU, back the interconnect pipe out of the Bio-Film Reactor and solvent weld the pipe to the outlet coupling of the clarification chamber. Then, connect the discharge sewer line to the Bio-Film Reactor outlet. Inlet and outlet lines must be laid continuously and unspliced from the tank to undisturbed earth beyond the limits of the tank excavation. If using a one-piece tank, insert the discharge sewer line through the tank outlet seal, leaving 4" - 6" protruding inside the tank. Solvent weld the 4" Schedule 40 PVC outlet tee (distributor to provide) to the discharge sewer line. High quality PVC or other similar materials may be used for sewer lines, subject to approval of local codes. Be sure the sewer lines are constructed with compatible fittings and joining materials throughout. Underground electrical cable for service to the pumps should be installed in the sewer line trench before backfilling. Refer to Model 801P Control Center Installation and Operation instructions for complete details.

#### GROUND WATER RELIEF POINT

The effluent sewer line should be installed with a ground water relief point to prevent back-up into the system if the effluent discharge point or absorption system is blocked or flooded. This device can be constructed by installing a pipe tee in the effluent sewer line and extending it to grade. The outlet must be at a lower elevation than the outlet invert of the Hydro-Kinetic system. The extension to grade should be installed with a suitable grate to prevent access to the sewer line.

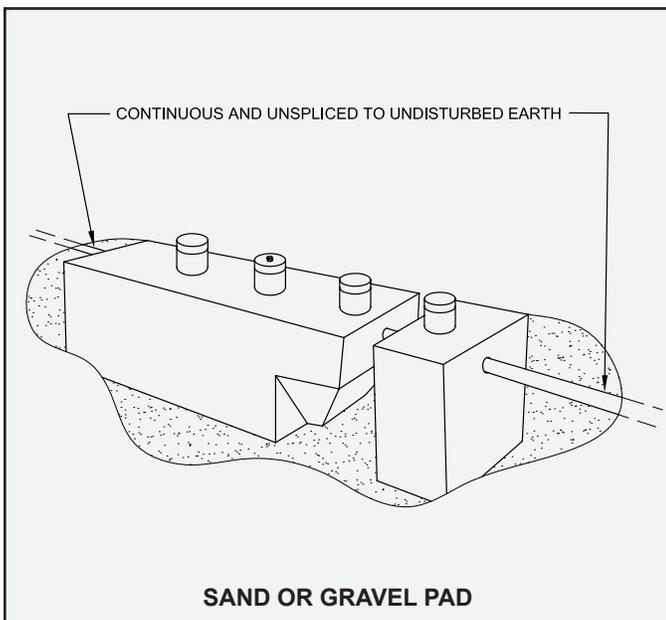
#### PRIOR TO BACKFILLING

For installations where the air pump will not be located in the aeration riser, install a 3/4" Schedule 40 PVC air line from the air pump to the system. The air line should be buried in a trench at a recommended depth of at least 12 inches. Protect the air line in a casing pipe if heavy loading is anticipated. The air line must be run into the aeration riser and the opening in the riser sealed with mortar or approved sealant.

Perform a visual inspection of the entire system before backfilling begins. Be sure the tank outlet and all transfers are free from obstructions. Check that there is sufficient fall in the inlet and outlet lines of the tank. Remove any dirt or debris from sealing surfaces such as those between the risers and covers. Insure tank has remained level within 1/4" from side to side and end to end. The system is now ready for backfilling.

#### BACKFILLING

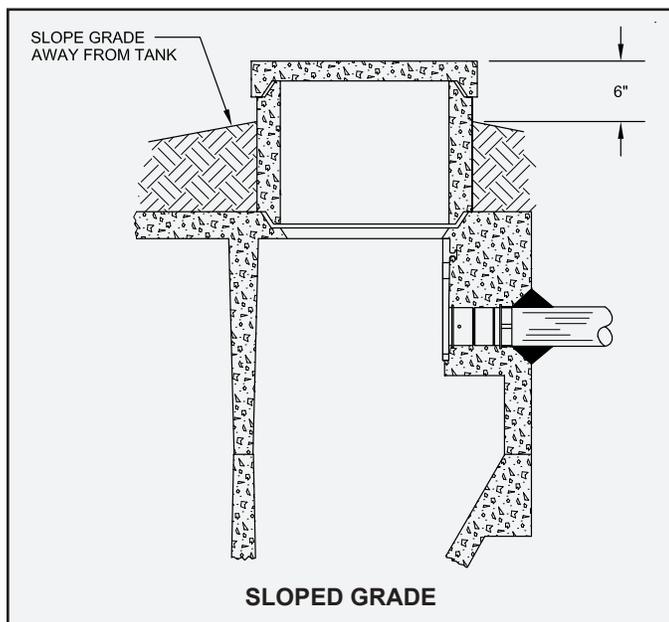
The system should be backfilled immediately after sewer lines and underground electrical cables are installed. Fine, loose earth should be used to backfill the tank excavation and sewer line trenches. Be sure it is completely free of rocks, large clumps of earth and construction debris. Use fine granular material when backfilling around electrical



## TANK DELIVERY AND SETTING (Page 6 of 6)

cables and conduits. The underground electrical cables should have at least 2' of earth cover. If the proposed finished grade will not permit this coverage, the cables should be installed in approved conduit from the tank to the building foundation. Backfill evenly around the entire perimeter of the tank rather than all at once on each side. Take care to completely fill in the cavity beneath the slanted clarifier end wall in order to provide the necessary support for this area of the casting.

Final grading should be 6" below the top of each riser access cover and should slope away from the tank so surface runoff will drain away from the system. Use extreme care in backfilling. Do not allow dirt or mud to enter any part of the treatment system or sewer lines. If dirt or mud enters any portion of the system, it must be removed to insure proper system operation. Removing the dirt or mud may require repeated flushing and tank pumping.



### TANK HOLD DOWN WATER

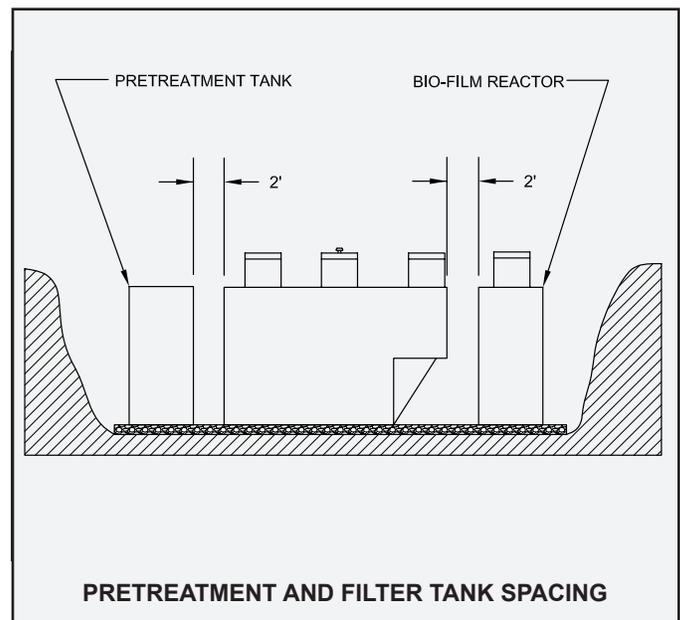
Each compartment of the treatment system must be filled with clean water to the outlet invert immediately following backfilling. Filling with water prevents tank shifting and insures the proper pressure distribution throughout the casting. The water must be free of leaves, mud, grit or other materials that might interfere with system operation. Do not fill the treatment system with water through the opening in the top of the clarification chamber. The clarification chamber will be filled by adding water to the aeration chamber.

This completes the portion of the installation that requires a delivery truck for tank lifting and setting. Installation of the electrical control center and underground electrical cable are normally completed by the delivery truck driver before leaving the site. Refer to the Model 801P Control Center Installation and Operation instructions for details.

## ALTERNATE TANK CONFIGURATIONS

The Hydro-Kinetic system is available in several different tank configurations. The entire system can be housed in a single five chamber casting, a four chamber casting with a separate Hydro-Kinetic Bio-Film Reactor casting, or can be split into three castings with external filter and pretreatment castings. There are advantages to each configuration. When installing a Singlair tank that has been converted to a Hydro-Kinetic tank, the pretreatment and filter chambers need to be plumbed to the three-chamber anoxic, aeration and clarification tank. Most of the system installation guidelines remain the same regardless of the tank configuration. If installing a system with a pretreatment chamber that is not integrated, this tank must maintain the same 2' spacing as between the filter and the clarification chambers, and is plumbed using the same technique. The inlet and outlet plumbing must be unspliced to beyond the limit of the earth displaced during the excavation no matter which tank configuration is installed.

The standard overdig distance of 6" should be maintained when installing a separate pretreatment tank. This distance should be extended when dealing with deep installations or where unstable soil conditions exist. The same 4" layer of gravel, sand or fine crushed stone should be used for a separate pretreatment tank, and must be leveled to within 1/4" from side to side and end to end. Remember to establish and maintain safe working conditions during the entire installation procedure.



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## MODEL 801P CONTROL CENTER WITH MCD TECHNOLOGY

# INSTALLATION AND OPERATION INSTRUCTIONS

The advanced integrated circuitry of the Service Pro control center simplifies the Hydro-Kinetic installation, improves system performance and allows for communication with the Service Pro website. The control center insert and enclosure provide space for power and communication wiring, as well as the communication module. The integrated circuitry continually monitors both recirculation pump over current and under current conditions and minimizes nuisance alarm conditions using the automatic restart feature. To reduce unnecessary service calls, the control center shuts down the recirculation pump in the event of an over current or an under current alarm condition, illuminates the alarm light and begins an automatic two hour recirculation pump restart attempt sequence before activating the audible alarm and telemetry system.

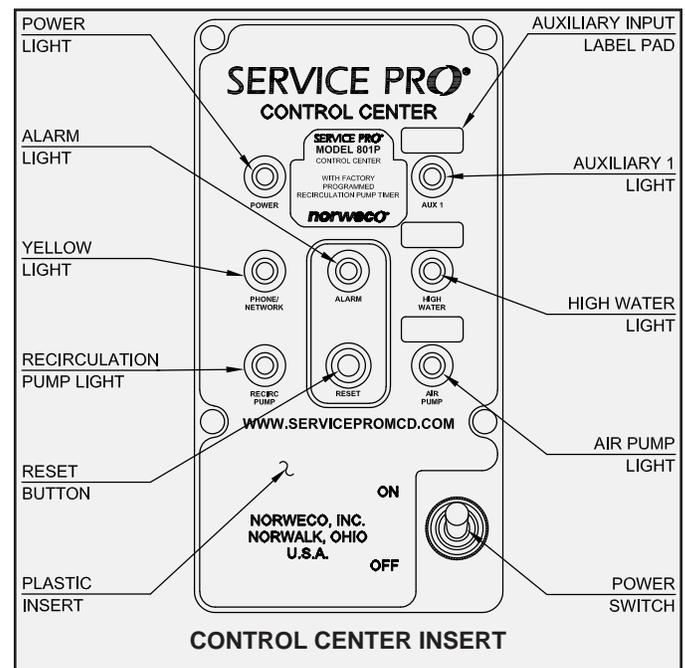
Service Pro Model 801P control centers are available with an automatic telemetry system designed to communicate through a toll free telephone number or an Internet connection. In the event of an alarm condition that cannot be corrected by the control center's self-diagnostic sequence, the telemetry system contacts the Service Pro remote monitoring center. The monitoring center identifies the alarming control center and logs the time that the message was received and specific alarm condition reported. The monitoring center then automatically updates the website and notifies the responsible Norweco distributor or service provider by email, fax or telephone. In addition to documenting alarm conditions, the website tracks the date, time and duration of service visits, service contract renewals and maintains a complete database for every Hydro-Kinetic system registered. Access to the information is password protected and available to licensed distributors, sponsored service providers, health departments and system owners.

These instructions are not intended to be a complete electrical, telecommunication or network system installation reference. Telecommunication and network system policies as well as electrical code requirements vary according to geographic area. Consult your local policies and regulations prior to installing the Service Pro control center. Refer to the Electrical Wiring and Control Center Installation instructions for additional details.

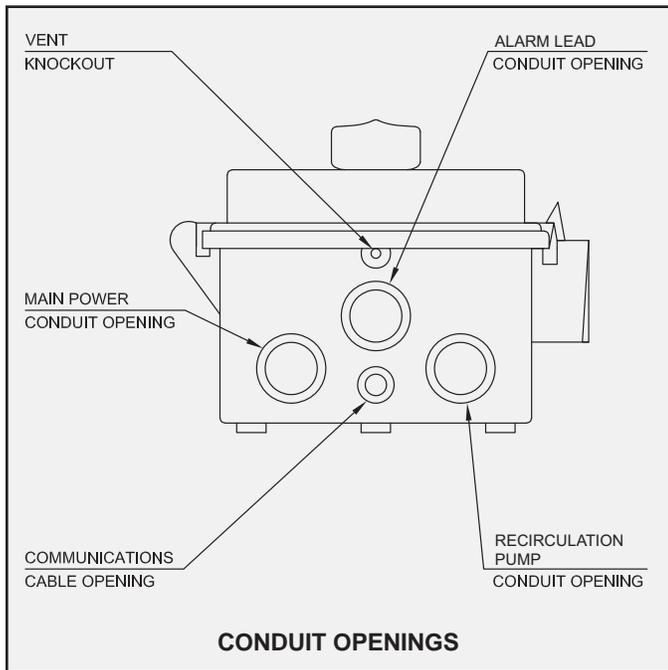
### INSTALLATION OF ELECTRICAL CONTROL CENTER

1. Electrical work must be performed in accordance with the latest edition of the National Electrical Code as well as applicable local codes.
2. All underground electrical service cable used with the Hydro-Kinetic system must be UL and CSA approved, type UF, #14/2 AWG minimum and must have a full-size center ground. Larger cable is required if the length of the underground service is greater than 80 feet. Consult your electrician for details.
3. An approved cable must be installed from the air pump to the junction box provided for connection to the control center. If installing the air pump in a location other than the aeration chamber riser, insure the air line is no more than 75' in length and the air pump is protected from the elements in a clean, dry, well-ventilated area and proceed to step 6.
4. Inspect the power cable entrance in the side of the aeration chamber riser. Remove any sharp edges or flash. Insert the free end of the power cable through a pre-formed ½" conduit ell (2' by 1'), then into the power cable entrance of the aeration riser. Guide the power cable into the riser. Pull enough cable through the riser to reach 36" above the riser top. Coil and secure the cable in the aeration chamber riser so that it will not hang down in the tank.

5. Lay the conduit ell with cable directly across the top and down the tank side. Do not allow the power cable to be laid across the end of the tank or any removable access cover. Seal the connection between the conduit and the aeration riser with mortar or approved sealant.



# SERVICE PRO® 801P CONTROL CENTER INSTRUCTIONS (Page 2 of 8)

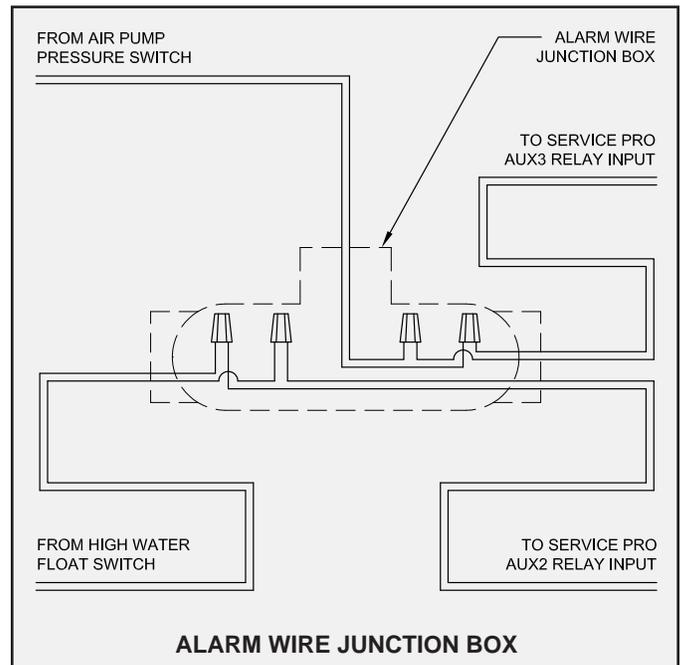


12. Uncoil the electrical service cables into the excavation and influent sewer line trench. Leave sufficient slack in the cables so they will not be stressed or pulled tight during backfill or settling.
13. Always encase the electrical cables in conduit any time they are above finished grade. Route the conduits and cables as directly as possible to the control center mounting location.

## COMPLETING THE INSTALLATION

1. The control center should be wired for operation when the tank and underground electrical cables are installed. The control center should be located so that the red warning light can be seen and the audible alarm heard. The mounting location should minimize exposure to direct sunlight, freezing rain or conditions that might prevent routine inspection or access. The control center should always be mounted out of the reach of children.

6. A second underground cable must be installed unspliced from the control center into the clarification riser to supply power to the recirculation pump.
7. Inspect the power cable entrance in the side of the concrete clarification riser. Remove any sharp edges or flash. Insert the free end of the power cable through a pre-formed ½" conduit ell (2' by 1'), then into the power cable entrance of the clarification riser. Guide the power cable into the riser. Pull enough cable through the riser to reach 36" above the riser top. Coil and secure the cable in the clarification riser so that it will not hang down in the tank.
8. Lay the conduit ell with cable directly across the top and down the tank side. Do not allow the power cable to be laid across the end of the tank or any removable access cover. Seal the connection between the conduit and the clarification riser with mortar or approved sealant.
9. Two alarm leads must be installed from the air pump pressure switch to the Service Pro control center. The alarm leads should be #16 AWG minimum and installed in conduit where contact with concrete may occur. **IMPORTANT:** Alarm leads and power leads must always be installed in separate conduits.
10. Two alarm leads must be installed from the high water float switch to the Service Pro control center. The alarm leads should be #16 AWG minimum and installed in conduit where contact with concrete may occur. **IMPORTANT:** Alarm leads and power leads must always be installed in separate conduits. If the air pump will be installed in the aeration riser, the high water and air pump alarm leads should be installed in the same conduit. Properly seal the conduit opening in the riser with mortar or approved sealant.
11. Check the excavation and sewer line trenches to be sure they are free of debris, rocks and any sharp or abrasive objects that could damage electrical cables or alarm leads during backfill or settling.



2. Remove the cover from the alarm wire junction box connected to the float switch. Solvent weld the junction box to the conduit containing the alarm leads, located in the aeration chamber riser.
3. Reference the schematic wiring diagram shown on page 3 for all wiring instructions. The black and white alarm wires contained in the alarm wire junction box are provided to connect the float switch to the Service Pro control center. Connect the black wire in

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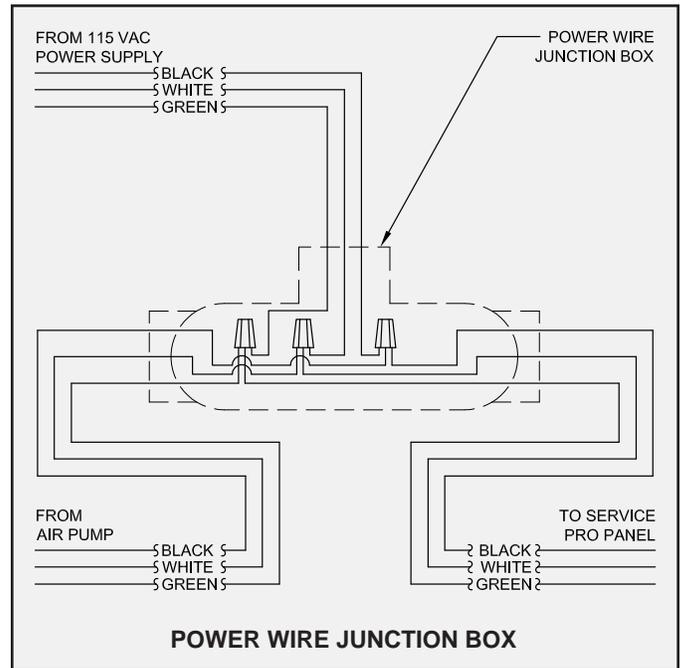
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## 801P CONTROL CENTER WITH MCD TECHNOLOGY

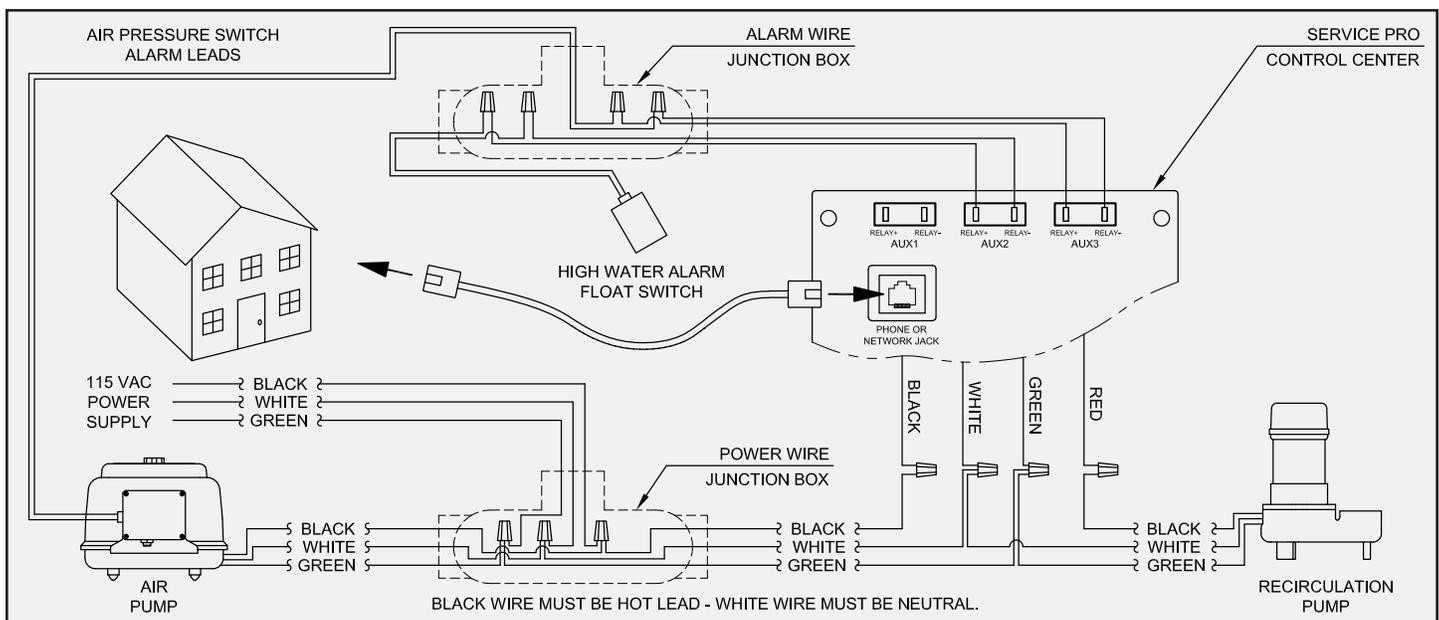
### INSTALLATION AND OPERATION (Page 3 of 8)

the junction box to either alarm lead from the control center, and secure with a wire nut connector. Connect the white wire in the junction box to the remaining alarm lead from the control center, and secure with a wire nut connector.

4. If the air pump is installed in the aeration chamber riser, solvent weld the conduit connection for the pressure switch alarm cable to the junction box. Connect the black wire in the pressure switch cable to either alarm lead from the panel, and secure with a wire nut connector. Connect the white wire in the pressure switch cable to the remaining alarm lead from the panel, and secure with a wire nut connector.
5. Reinstall and secure the cover on the alarm wire junction box. Plug any unused junction box openings.
6. Proceed to the control center. Detach the cover from the control center enclosure and remove the insert from the mounting posts. Set the control center insert aside. Remove the knockouts in the bottom of the enclosure and install a sealed conduit connector (distributor to provide) in each opening. Exposed wiring to or from the control center should always be encased in conduit. Mount the control center securely using masonry nails, wood screws or common nails as appropriate.
7. Use a dedicated 115 VAC, single-phase circuit at the main electrical service panel. A 15 amp circuit is recommended (10 amp minimum). **CAUTION: Make sure the circuit is de-energized. Check it with an electrician's test light before proceeding. Remember that other circuits in the service panel may remain energized as you are working. Use only tools with insulated handles, stand in a dry location and work with extreme care.**



8. Open the insulator on the back of the control center insert to access the power and alarm wiring connections.
9. Install a #14/2 AWG minimum cable with full-size center ground from the control center to the power wire junction box provided for connection to the control center.
10. Wire from the dedicated circuit breaker in the main service panel to the power wire junction box. Use at least #14 AWG black copper wire. Connect the black wire from the main service panel to the black wire in the air pump power relay cable and the black wire to the control center. Secure with a wire nut connector.



# SERVICE PRO® 801P CONTROL CENTER INSTRUCTIONS (Page 4 of 8)

11. Wire from the neutral in the main service panel to the junction box. Use at least #14 AWG white copper wire. Connect the white wire from the main service panel to the white wire from the air pump power cable and the white wire to the control center. Secure with a wire nut connector.
12. Connect the ground wire from the main electrical service panel to the non-insulated ground lead from the air pump and the ground wire to the control center. Secure with a wire nut connector. **IMPORTANT:** Never allow the white neutral leads and the ground leads to be spliced together.
13. Install the cover on the junction box and proceed to the control center.
14. Connect the black wire from the junction box to the black wire on the control center. Secure with a wire nut connector.
15. Connect the black lead of the underground electrical cable from the recirculation pump to the red wire on the Service Pro control center and secure with a wire nut connector.
16. Connect the white wire from the junction box to the white wire from the recirculation pump and white wire on the Service Pro control center. Secure with a wire nut connector.
17. Connect the ground wire from the junction box to the non-insulated ground lead from the recirculation pump and the green wire on the control center. Secure with a wire nut connector. **IMPORTANT:** Never allow the white neutral leads and the ground leads to be spliced together.
18. Connect the alarm leads from the high water float switch to the AUX2 RELAY terminals on the control center.
19. Connect the alarm leads from the air pump pressure switch to the AUX3 RELAY terminals on the control center.

20. If the remote monitoring features of the control center will be utilized, refer to the PHONE OR NETWORK CABLE INSTALLATION section of this document.

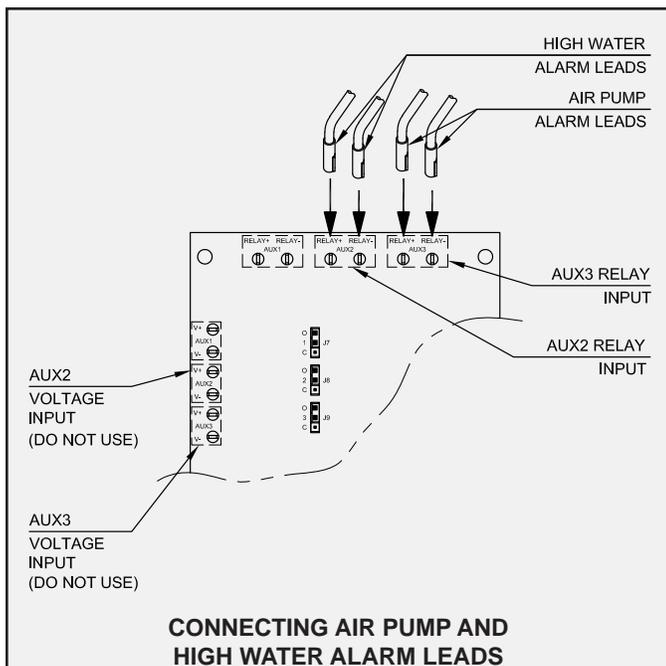
**IMPORTANT: Never install the communication cable in a conduit with power lines.**

21. Check all wiring connections after wiring has been completed. Make sure all wires are properly secured in each wire nut connector. Correct any wiring issues before proceeding.
22. Carefully form all wiring neatly into the lower part of the control center. Do not allow the wires to make contact with other electrical components in the control center. The conduit openings in the enclosure must now be sealed using expanding foam sealant (available from Norweco).
23. Close the black insulator and snap the control center insert into position. Reinstall and close the control center cover. Secure it with the Norweco tamper evident seal.
24. Clearly label the dedicated circuit breaker used for the Hydro-Kinetic system on the door of the main service panel. Replace the service panel deadfront and enclosure cover.

## ALARM INPUTS

The Service Pro control center will accept alarm inputs that generate several different types of output: a 5 to 120 volt AC or DC signal, a normally open relay circuit or a normally closed relay circuit. The inputs on the control center are male 0.110" quick connect terminals and accept standard female 0.110" insulated quick connect receptacles. When connecting to the alarm inputs:

1. Determine the type of output that will be generated by the alarm device you wish to connect. The high water and air pump alarms use normally open relay circuits.
2. Route the leads through one of the conduits not being used for power lines into the bottom of the enclosure. Be sure to pull enough wire to comfortably reach the two AUX 1 auxiliary terminals you will be connecting to on the back of the control center insert.
3. Crimp the insulated female 0.110" quick connect receptacles to the ends of the alarm leads.
4. Connect the leads to the corresponding auxiliary alarm inputs. When connecting a relay circuit, connect to the "RELAY +" and "RELAY -" terminals. For a voltage input, connect the leads to the auxiliary alarm terminals marked "V+" and "V-".



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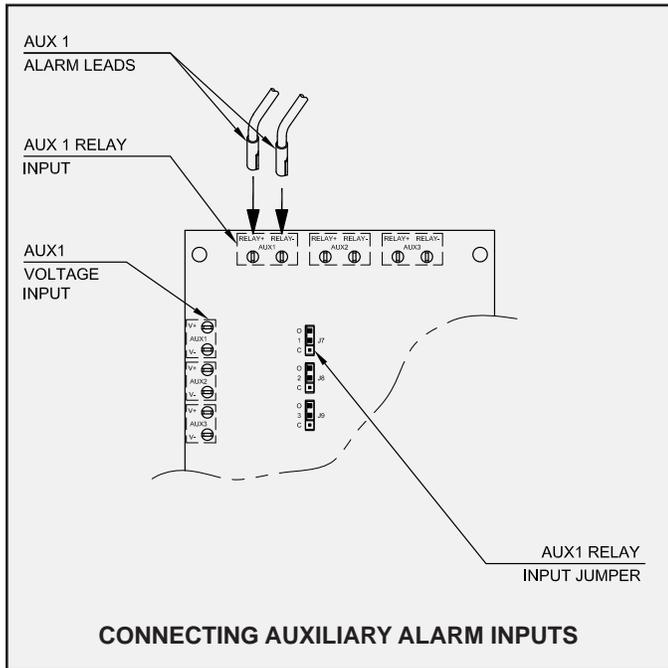
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## 801P CONTROL CENTER WITH MCD TECHNOLOGY

# INSTALLATION AND OPERATION (Page 5 of 8)

**IMPORTANT: Never connect a voltage input to the RELAY terminals on the circuit board. This may damage the controls and will void the warranty.**

- When connecting a device that uses a relay contact setting, you will need to set the jumper for the correct relay configuration. If the alarm circuit is normally closed, place the jumper over the bottom two jumper pins closest to the 'C' label. If the alarm circuit is normally open, place the jumper over the top two jumper pins closest to the 'O' label.



### PHONE OR NETWORK CABLE INSTALLATION

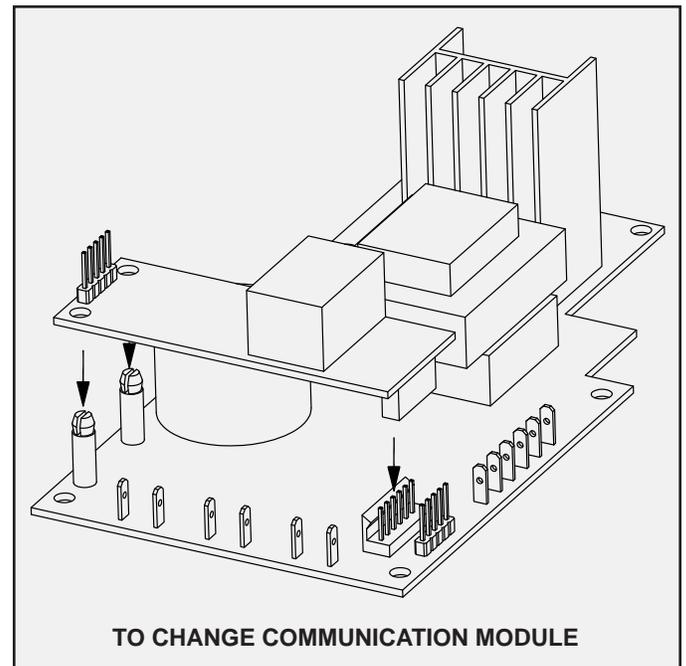
If a telephone connection will be utilized, a telephone line must be installed unspliced from the telephone box to the Service Pro control center. Before installing the telephone line, familiarize yourself with the equipment and policies of the local telephone service provider. The Service Pro control center is not compatible with digital telephone service. With DSL Internet service, a DSL filter will need to be connected to the telephone jack on the Service Pro controls to insure proper operation of the monitoring feature. If a telephone line is not available, one will need to be installed by the local telephone service provider or an Internet communication module should be utilized.

If an Internet connection will be utilized, a network cable must be installed from the Internet connection in the home to the Service Pro control center. The network cable will typically be plugged into a switch or router that distributes Internet service in the home. Regardless of whether the communications will take place through a phone line or the

Internet, the following steps must be performed to complete system wiring:

- Make sure the dedicated circuit breaker in the main service panel is in the "off" position. Using the alarm input conduit or one of the grommets provided, run the telephone or network cable into the bottom of the enclosure. The appropriate knockout will need to be removed from the bottom of the Service Pro control center enclosure before the cable can be installed. NOTE: The telephone or network cable cannot be installed into a conduit with any power lines. Crimp the appropriate phone or network jack on the communications cable in the control center.
- Connect the telephone or network cable into the jack provided on the control center. Connect the other end of the communications cable to the existing telephone system or home Internet service.
- Confirm the phone or network module is securely seated into the socket on the main control circuit board.
- Snap the control center insert into position. Close the control center cover.

The Model 801P is available with the network module, the telephone module or without either communication module installed. The modules are interchangeable and can be added or exchanged in the field. If you are exchanging modules, first insure power is off and remove the existing module from the circuit board by unplugging it from the socket. To install a new module, snap the new module onto the two plastic standoffs on the circuit board and securely plug the module into the socket provided.



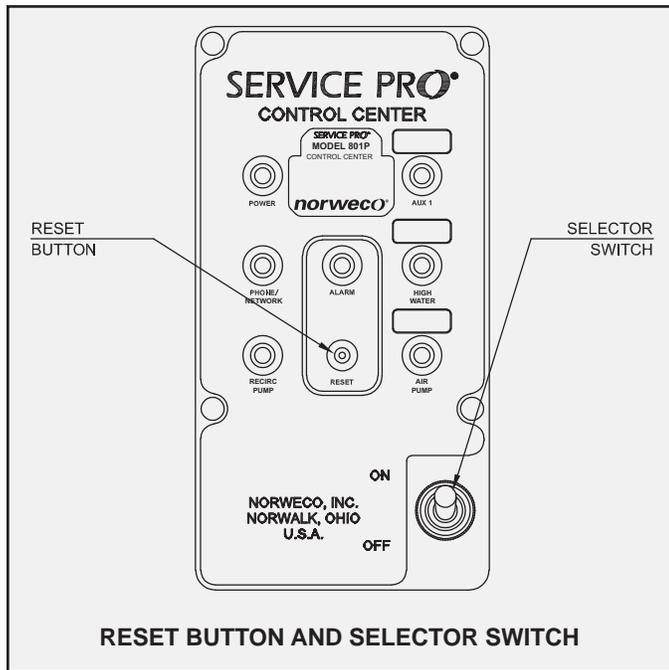
# SERVICE PRO® 801P CONTROL CENTER INSTRUCTIONS (Page 6 of 8)

## TELEMETRY SYSTEM COMMISSIONING

Each control center is shipped with the integrated telemetry system disabled. All other monitoring, diagnostic and local alarm functions will operate as designed. The reset button is used to enable the integrated telemetry system once the communications cable has been connected. This process is referred to as commissioning the control center. Commissioning notifies the Service Pro monitoring center that the control center is functional and ready to transmit information.

To commission the control center, insure the dedicated circuit breaker in the main service panel is in the "on" position and the communications cable is properly installed. Place the control center selector switch in the "off" position. While holding in the reset button, place the selector switch in the "on" position. Continue to hold the reset button until the red alarm light illuminates. Release the reset button and allow the telemetry system up to sixty seconds to call out and complete the commissioning process. The yellow light will illuminate during the call out process.

If commissioning is successful, the alarm light will flash 5 short flashes and stop as verification. If commissioning is unsuccessful, the alarm light will flash a pattern that indicates the cause of the failed communication. The pattern will display repeatedly. If the commissioning is not successful, refer to the table on page 7 for troubleshooting information. Conduct an alarm test to confirm commissioning was successful. If the yellow light does not illuminate during the alarm test, recommission the panel and refer to the table on page 7.



RESET BUTTON AND SELECTOR SWITCH

### RESET BUTTON

The reset button on the Service Pro control center is used to perform multiple tasks during installation and operation. To activate the reset button, apply pressure with your index finger. The button is activated when a "click" is heard.

The reset button can be used to silence the audible alarm, turn on the recirculation pump when it is in an off cycle or restart the run cycle when the recirculation pump is running. The reset button is also used to test the control center audible and visual alarms and telemetry system. **NOTE: To prevent damage to the control center, excessive pressure on the reset button should be avoided.**

To test the alarms, press and hold the reset button for approximately five seconds until the audible and visual alarms activate and then release. If the control center is equipped with a communications module, the panel will call out and deliver an alarm test message to the Service Pro monitoring system. Once the communication is complete, the yellow light will turn off and the control center will return to normal operation.

The reset button can also be used to record service visits. When arriving on site, press and hold the reset button for five seconds until the alarm test feature activates, then release the button. The panel will call to record the start of the service visit. After the control panel has completed the alarm test call, routine service should be performed on the Hydro-Kinetic system. Once system service has been completed, press and hold the reset button again for five seconds until the alarm test feature activates. The Service Pro control center will register two alarm test calls received within a four hour period as a service visit. The date, time and duration of the service visit will be logged in the database for future reference.

## RECIRCULATION PUMP TIMER

Each control center is supplied with a timer that determines the run time of the recirculation pump. The timer is factory preset and should not be adjusted.

## ALARM CONDITION OPERATING SEQUENCE

When the control center detects an over current or an under current alarm condition, the alarm light will activate and flash a code that specifies the alarm condition that was detected. If an under current or open motor condition is detected, the alarm light will flash two short flashes. If an over current condition is detected, the alarm light will flash steadily. If either an over current or an under current alarm condition is detected, the recirculation pump is shut down and an automatic system restart sequence begins. With

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# INSTALLATION AND OPERATION (Page 7 of 8)

the alarm light flashing, the control center will automatically attempt to restart the recirculation pump every five minutes for a period of two hours (24 restart attempts). The control center monitors pump current during each restart attempt. If the proper level of current is detected, the control center returns the pump to normal operation and turns off the alarm light. Pressing the reset button while the alarm light is flashing causes the control center to attempt to restart the recirculation and counts toward the 24 restart attempts. If the recirculation pump does not restart after 24 attempts, the audible alarm and the alarm light activate.

After both audible and visual alarms are activated, press the reset button and the control center will attempt to restart the recirculation pump again. If the proper current level is not detected, the audible alarm beeps three times, then silences. The alarm light continues to flash and the control center interrupts power to the recirculation pump. If the alarm condition is not corrected and the control center resets after 48 hours, the audible alarm will automatically reactivate. If a control center problem is detected, the alarm light will illuminate continuously and the audible alarm will activate. If a high water, air pump or auxiliary alarm condition is detected, the audible alarm and the corresponding auxiliary alarm light will activate.

If the telemetry system on the Service Pro control center has been commissioned, the system will then attempt to call out after a five minute delay and deliver an alarm

message. The system will call the Service Pro monitoring center every 48 hours until the alarm condition is corrected and the control center is reset. The Service Pro control center uses advanced diagnostic technology to monitor the Hydro-Kinetic system for proper operation. In the event an alarm condition is encountered, the control center will display a series of flashes from the alarm light located in the center of the control panel (refer to the Red Alarm Light Diagnostic Codes chart below for further reference).

### SYSTEM HEARTBEAT FEATURE

The Service Pro control center contains a system heartbeat feature that will call out every 30 days to inform the monitoring center that the Hydro-Kinetic treatment system is functioning as designed. If the heartbeat call is not received, the monitoring center will notify the distributor or service provider that service is required at that system location.

### POWER FAILURE MONITORING

The Service Pro Model 801P control center includes circuitry that detects and reports power failure conditions. In the event that power is disconnected from the control center, either by a power outage or by turning off the power switch in the control center, the control center will place a call to the Service Pro monitoring center one hour after power has been restored to report the outage.

<b>RED ALARM LIGHT DIAGNOSTIC CODES</b>	
<b>CONDITION</b>	<b>RED ALARM LIGHT FLASH PATTERN</b>
Successful commissioning	Flash 5 short and stop
Alarm test	Flash 10 short and stop
Service visit start	
Service visit end	
Communications cable not plugged in	Flash 1 short, 1 long - pause 3 seconds & repeat
Phone line in use in home	Flash 2 short, 1 long - pause 3 seconds & repeat
Number called is busy	Flash 3 short, 1 long - pause 3 seconds & repeat
Remote monitoring center error	Flash 4 short, 1 long - pause 3 seconds & repeat
Phone service terminated	
Service Pro panel communication error	Flash 5 short, 1 long - pause 3 seconds & repeat
Control failure	Illuminate continuous
Recirculation pump under current	Flash 2 short - pause 3 seconds & repeat
Recirculation pump open motor	Flash 2 short - pause 3 seconds & repeat
Recirculation pump over current	Flash evenly until serviced
Auxiliary one alarm	
High water alarm	
Air pump alarm	

# SERVICE PRO® 801P CONTROL CENTER INSTRUCTIONS (Page 8 of 8)

## FCC COMPLIANCE

This equipment complies with Part 68 of the FCC rules and the requirements adopted by the ACTA. The label on the inside of the control center cover contains, among other information, a product identifier in the format US:S2KMM00BMCD. If requested, this number must be provided to the telephone company.

If the Service Pro control center causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operations of the equipment. If this happens the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

If trouble is experienced with the Service Pro control center, for repair or warranty information, please contact Norweco, Inc. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

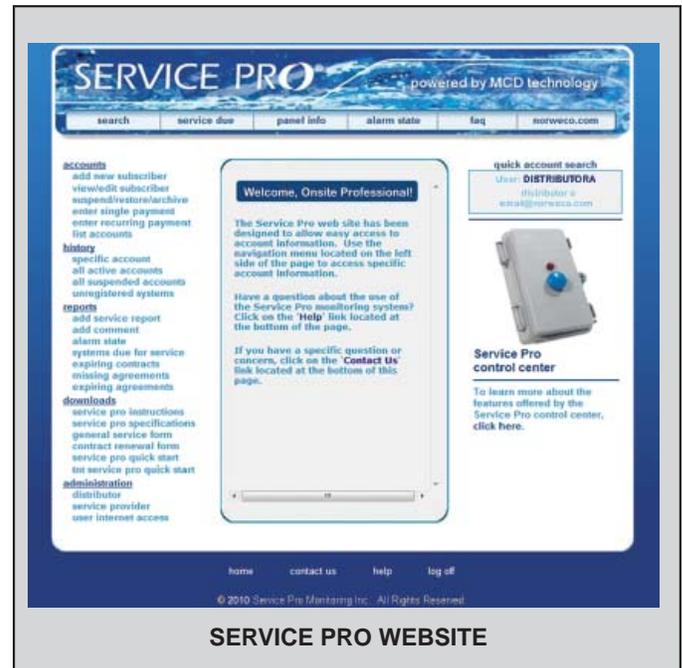
## SERVICE PRO WEBSITE & REGISTRATION

The telemetry system, available with the Service Pro Model 801P control center, is engineered to interface with the Service Pro monitoring center. The Service Pro monitoring center allows the homeowner, service provider, licensed Norweco distributor and authorized regulatory entities to access Hydro-Kinetic wastewater treatment system records online. Records generated by the Service Pro control center (heartbeat record, alarm conditions, service records) can be accessed at [www.servicepromcd.com](http://www.servicepromcd.com). For access to the website, contact your local distributor or Norweco, Inc.

**WARNING:** The Service Pro Model 801P control center is designed to monitor residential wastewater treatment equipment only. Connection of household appliances or other unauthorized equipment may damage equipment and void the Hydro-Kinetic system warranty.

Permanent record retention and remote monitoring of the Hydro-Kinetic system will begin when the following steps have been completed:

- The "Add New Subscriber" section of the website has been completed by the Hydro-Kinetic distributor or service provider.
- The system is started up and the Service Pro control center is commissioned.



- Three copies of the signed Service Pro Subscriber Monitoring Agreement are received by Norweco.

The Service Pro control center can be commissioned either before or after the new account has been registered with the Service Pro monitoring center. However, if the commissioning step is performed first, the registration of the new account must be completed within 30 days of commissioning.

The Getting Started Website Instructions provide details on registering a new account on the Service Pro website. Add each new account by using the information recorded on the Monitoring Agreement form.

The Monitoring Agreement is completed with the owner of each system to be monitored by the website. The top three copies of the Agreement should be submitted to Norweco. This activates monitoring and satisfies Norweco's warranty registration procedure. Each new subscriber must sign a 24 month monitoring agreement. If the monitoring agreement is not received by Norweco, Inc. within 60 days of the new account being commissioned, the account will be suspended until the monitoring agreement is received. To insure continuous monitoring, agreements are automatically renewed. Initial and renewal Hydro-Kinetic service contracts should include the cost to provide the Service Pro monitoring service. Refer to the Subscriber Monitoring Agreement Guide for further information.



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## **WASTEWATER TREATMENT SYSTEM AIR PUMP AND PIPING INSTALLATION**

Installation of the Model A100 air pump, Model SD103 recirculation pump, and associated plumbing should take place when the Hydro-Kinetic wastewater treatment system is ready for start-up. Refer to the Recirculation Pump and Piping Installation instructions for specific details regarding recirculation system installation. Your delivery truck driver should have instructed the contractor or owner to contact your office and make arrangements for equipment installation to coincide with occupancy and sanitary sewer use. Review your Hydro-Kinetic tank setting records weekly to insure that you do not have equipment installations that are overdue. If you suspect that adequate time has passed for system start-up and you have not yet heard from the owners, contact them to schedule equipment installation.

### **PRE-INSTALLATION CHECKLIST**

- ✓ The installer should have accurate directions to the facility and a list of service inspections due at other installations in the vicinity.
- ✓ The service vehicle should carry the Hydro-Kinetic Tool Kaddy fully stocked with tools, spare parts and test equipment for use during installation.
- ✓ The installer should have the Hydro-Kinetic Product Manual.
- ✓ The owner or contractor should be present at the location to allow installer access to the control center and electrical service panel.
- ✓ The main electrical service panel wiring must be complete so the air pump may be started-up and tested.
- ✓ All chambers of the Hydro-Kinetic tankage should be full to the flow line.
- ✓ The serial number on the air pump must match the service and warranty record card.

### **AIR PUMP START-UP PROCEDURE**

When you arrive on site, introduce yourself to the owner and ask to see the main electrical service panel and Service Pro control center. Be certain each circuit for the Hydro-Kinetic system in the main electrical service panel is de-energized and that the power switch in the Service Pro control center is placed in the "off" position. Explain to the owner that you will be installing the air pump and piping in the tank and you will need access to the main electrical service panel for system start-up after the air pump and piping have been installed. Carry the air pump and piping in its shipping carton to the tank site. Place the Hydro-Kinetic Tool Kaddy nearby for easy access to tools and test equipment. Remove the vented cover from the aeration chamber riser casting. Carefully remove the Model A100 air pump and air piping components from the shipping carton. For installations where the air pump will not be located in the riser, refer to the Remote Installation of Air Pump section of this document.

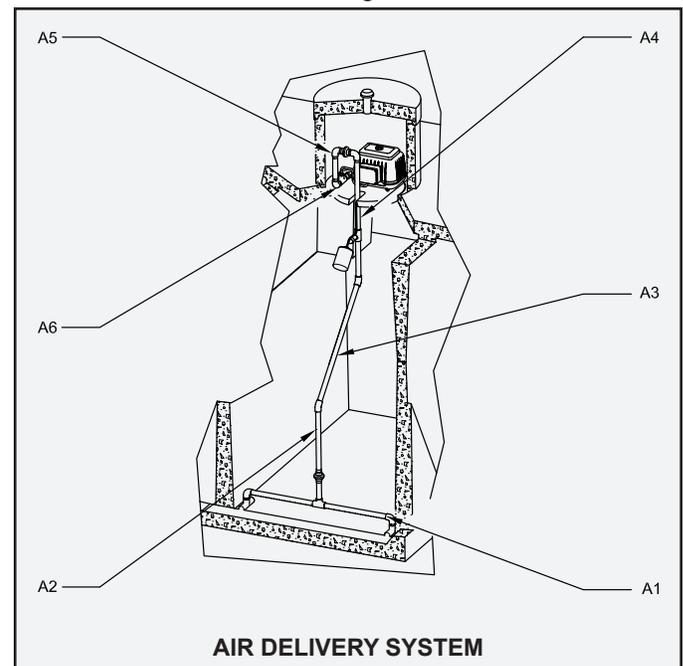
### **AIR PIPING COMPONENTS**

The air piping components of the concrete Hydro-Kinetic system are:

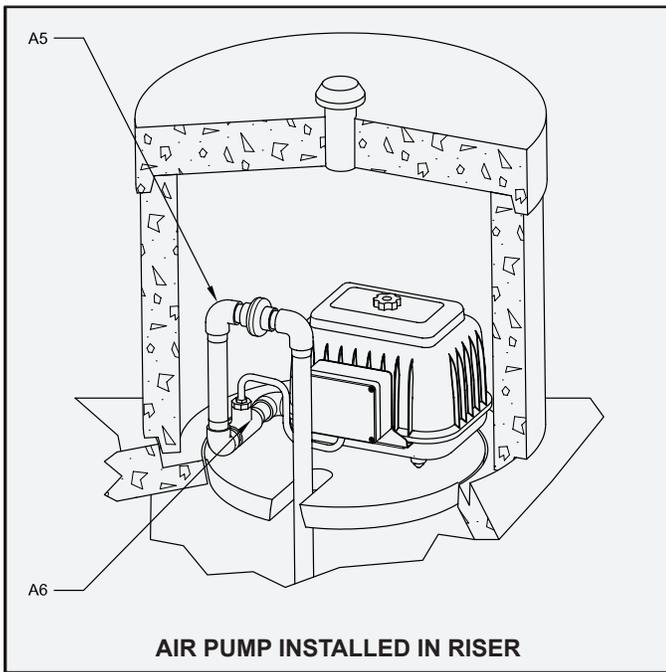
1. Diffuser (Subassembly A1)
2. Diffuser Drop Pipe Assembly (Subassemblies A2-A4)
3. Primary Air Assembly (Subassemblies A5, A6)

### **AIR PUMP AND PIPING INSTALLATION**

1. Remove the contents from red mesh bag with components labeled "AIR". Attach diffuser bar A1 to subassembly A2 at union. Securely tighten union by hand.
2. Solvent weld subassembly A2 to subassembly A3. Insure red arrows are aligned.



## AIR PUMP AND PIPING INSTALLATION (Cont.)



3. Solvent weld subassembly A3 to subassembly A4. Insure blue arrows are aligned.
4. Install the drop pipe assembly into aeration chamber by bending the flexible tubing. Lower assembly into the tank until the diffuser bar contacts both the floor and side wall of the tank.
5. If the air pump will be installed in the aeration chamber riser, solvent weld subassembly A5 to subassembly A6. Insure yellow arrows are aligned. Install the air pump concrete mounting pad in the aeration chamber riser.
6. Install the air pump in the aeration chamber riser on the air pump concrete mounting pad (or in a clean, dry, well-ventilated area protected from the elements no more than 75' from the tank). Attach subassembly A4 to subassembly A5 at union. Securely tighten union by hand.
7. To wire the air pump female electrical connector, unscrew the three captive stainless steel screws from the face of the female connector. They will stay in the body of the receptacle. Lift out the rigid internal receptacle body. Unscrew the compression nut on the strain relief connector. Insert the electrical service cable through the compression nut, compression ring and neoprene grommet.
8. Strip the outer insulation back 1¼" on the underground electrical service cable and expose the three individual leads. Use extreme care to be sure the insulation jackets on the individual black and white leads are not scarred or damaged while stripping the outer jacket.
9. Strip off the insulation jackets 7/16" from the ends of the individual black and white leads.
10. Insert the black lead into the hole adjacent to the brass-colored screw and tighten the screw securely.
11. Insert the white lead into the hole adjacent to the silver-colored screw and tighten the screw securely.

12. Insert the bare copper ground lead into the hole that is adjacent to the green-colored screw and tighten the screw securely.
13. Align the insert key on the receptacle body with the keyway molded into the rubber sleeve. Press the receptacle body into the sleeve and tighten the three stainless steel screws on the face of the connector. Press the grommet into the electrical connector and tighten the compression nut.
14. Plug in the air pump and check the air piping for leaks. Use a soapy water solution to thoroughly coat the piping and check for bubbles. Repair any leaking pipe or fitting and retest.

### REMOTE INSTALLATION OF AIR PUMP

If required, the air pump can be remotely installed in a location other than the aeration chamber riser. Remote installation requires a riser that has been modified to allow for the passage of the Schedule 40 PVC air line.

1. Route the piping through the riser wall in an orientation that allows for the removal of the air pump concrete mounting pad at the bottom of riser, and subassemblies A1-A4. After passing the PVC air line through the riser wall, dry fit a 90 degree elbow and subassembly A5 to the end of the air line passing through riser wall and insure proper orientation.
2. After confirming that the orientation of the air delivery piping will allow sufficient access, solvent weld air line, elbow and subassembly A5 together.
3. Mount the air pump in a location that will remain clean and dry no more than 75' from the tank. The pump should be easily accessible for service without the need to contact the owner. The air pump should be mounted close enough to the power supply to avoid the use of extension cords. The air pump electrical connection can be directly plugged into a standard outlet, or can be wired through a junction box.
4. Route the air line from the riser to the air pump location. The air line should be buried at a minimum depth of 2' for protection. If loading is expected, the air line can be placed in a larger outer conduit pipe.
5. Subassembly A6 should always be mounted directly to the pump in both standard and remote installations. A6 has a fitting for attaching the hose for the pressure switch which controls the pump. The pressure switch is located in the housing attached to the side of the pump. The cable exiting the housing must either be wired directly to the control panel, or through a junction box.

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U.S.A. 44857**

**www.norweco.com**

# ***norweco***® **HYDRO-KINETIC**®

## WASTEWATER TREATMENT SYSTEM

# RECIRCULATION PUMP AND PIPING INSTALLATION

Installation of the Model A100 air pump, Model SD103 recirculation pump, and associated plumbing should take place when the Hydro-Kinetic wastewater treatment system is ready for start-up. Refer to the Air Pump and Piping Installation instructions for specific details regarding air delivery system installation. Your delivery truck driver should have instructed the contractor or owner to contact your office and make arrangements for equipment installation to coincide with occupancy and sanitary sewer use. Review your Hydro-Kinetic tank setting records weekly to insure that you do not have equipment installations that are overdue. If you suspect that adequate time has passed for system start-up and you have not yet heard from the owners, contact them to schedule equipment installation.

### PRE-INSTALLATION CHECKLIST

- ✓ The installer should have accurate directions to the facility and a list of service inspections due at other installations in the vicinity.
- ✓ The service vehicle should carry the Hydro-Kinetic Tool Kaddy fully stocked with tools, spare parts and test equipment for use during installation.
- ✓ The installer should have the Hydro-Kinetic Product Manual.
- ✓ The owner or contractor should be present at the location to allow installer access to the control center and electrical service panel.
- ✓ The main electrical service panel wiring must be complete so the recirculation pump may be started-up and tested.
- ✓ All chambers of the Hydro-Kinetic tankage should be full to the flow line.
- ✓ The serial number on the recirculation pump must match the service and warranty record card.

### RECIRCULATION PUMP START-UP PROCEDURE

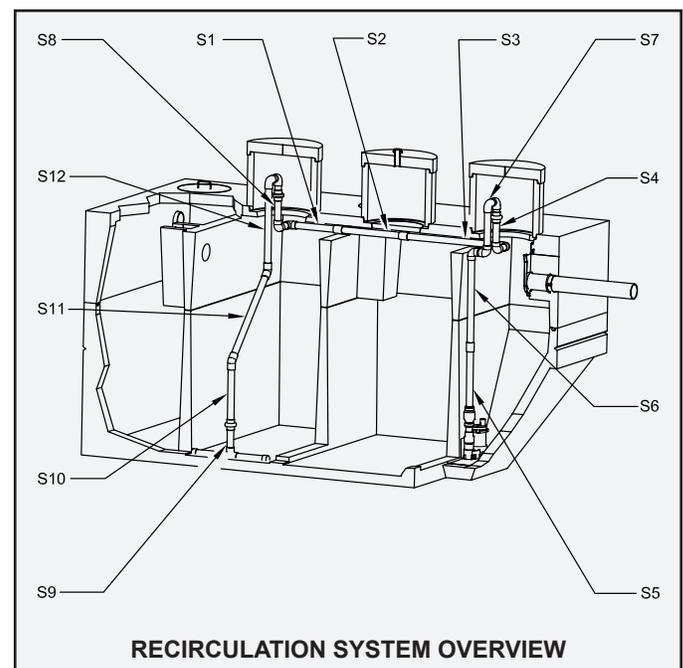
When you arrive on site, introduce yourself to the owner and ask to see the main electrical service panel and Service Pro control center. Be certain each circuit for the Hydro-Kinetic system in the main electrical service panel is de-energized and that the power switch in the Service Pro control center is placed in the “off” position. Explain to the owner that you will be installing the recirculation pump and piping in the tank and you will need access to the main electrical service panel for system start-up after the recirculation pump and piping have been installed. Carry the recirculation pump and piping in its shipping carton to the tank site. Place the Hydro-Kinetic Tool Kaddy nearby for easy access to tools and test equipment. Remove the access covers from the anoxic and clarification chamber risers. Carefully remove the recirculation pump and recirculation piping components from the shipping carton.

### RECIRCULATION PIPING COMPONENTS

The recirculation piping components of the concrete Hydro-Kinetic system are:

1. Intermediate Recirculation Assembly (Subassemblies S1-S3)

2. Primary Recirculation Assembly (Subassemblies S4-S7)
3. Mixing Bar Drop Pipe Assembly (Subassemblies S8, S10-S12)
4. Mixing Bar (Subassembly S9)

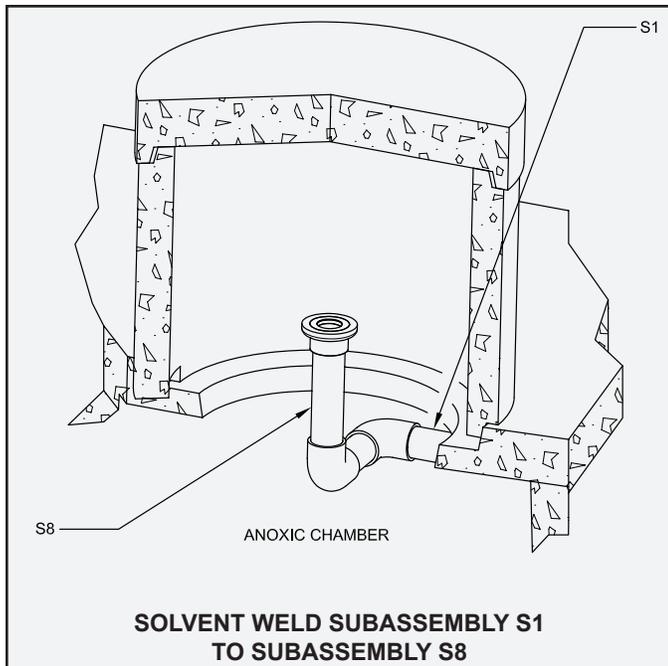
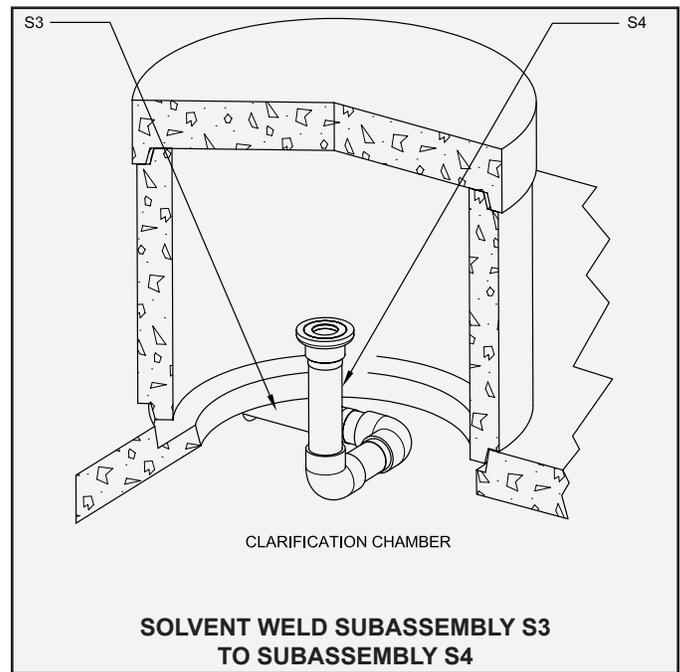


# RECIRCULATION PUMP AND PIPING INSTALLATION (Cont.)

## RECIRCULATION PUMP AND PIPING INSTALLATION

### In the clarification chamber:

1. Remove the contents from black mesh bag with components labeled "SLUDGE". Solvent weld subassembly S3 to subassembly S4 in the clarification chamber (S3 was installed with the tank equipment package). Be sure the union is facing up.
2. Thread subassembly S5 into the pump discharge.
3. Solvent weld the coupling on subassembly S5 to subassembly S6.
4. Solvent weld subassembly S6 to subassembly S7.
5. Attach pump cord to the pump discharge assembly (S5-S7) using cable ties provided.
6. Use discharge assembly to lower pump into the clarification chamber until pump rests on the floor of the hopper. Attach subassembly S4 to subassembly S7 at union. Securely tighten union by hand.



### In the anoxic chamber:

7. Solvent weld subassembly S1 to subassembly S8 (S1 was installed with the tank equipment package). Be sure the union is facing up.
8. Attach subassembly S9 to subassembly S10 at union. Securely tighten union by hand.
9. Solvent weld subassembly S10 to subassembly S11. Insure yellow arrows are aligned.
10. Solvent weld subassembly S11 to subassembly S12. Insure green arrows are aligned.
11. Bend mixing bar assembly at flexible tubing and lower into anoxic chamber until mixing bar is positioned as shown. Attach subassembly S12 to subassembly S8 at union. Securely tighten union by hand.
12. Wire the recirculation pump female electrical connector. Unscrew the three captive stainless steel screws from the face of the female connector. They will stay in the body of the receptacle. Lift out the rigid internal receptacle body. Unscrew the

13. compression nut on the strain relief connector. Insert the electrical service cable through the compression nut, compression ring and neoprene grommet.
13. Strip the outer insulation back 1/4" on the underground electrical service cable and expose the three individual leads. Use extreme care to insure the insulation jackets on the individual black and white leads are not scarred or damaged while stripping the outer jacket.
14. Strip off the insulation jackets 7/16" from the ends of the individual black and white leads.
15. Insert the black lead into the hole adjacent to the brass-colored screw and tighten the screw securely.
16. Insert the white lead into the hole adjacent to the silver-colored screw and tighten the screw securely.
17. Insert the bare copper ground lead into the hole that is adjacent to the green-colored screw and tighten the screw securely.
18. Align the insert key on the receptacle body with the keyway molded into the rubber sleeve. Press the receptacle body into the sleeve and tighten the three stainless steel screws on the face of the connector. Press the neoprene grommet into the electrical connector and tighten the compression nut.
19. Plug the male connector on the recirculation pump power cord into the female connector.
20. Install the flow equalization device by sliding it into the tank receiving flange in the clarification chamber. Insure the device is completely seated in the flange.

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## **WASTEWATER TREATMENT SYSTEM FINAL CHECK & SYSTEM START-UP**

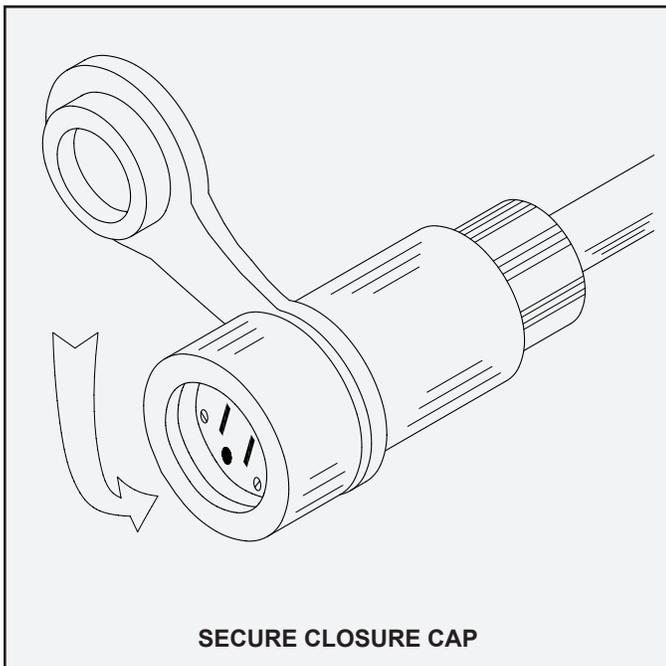
Immediately following installation of the Model A100 air pump, Model SD103 recirculation pump, and piping, the entire Hydro-Kinetic system should be given a final check and start-up. All tests should be performed to insure equipment is installed and operating properly. After all tests are satisfactorily completed, the power switch in the Service Pro control center should be set to "on" position. The air pump and recirculation pump should not be turned off, even during extended vacation periods. If the system will not be operated for an extended period of time, the air pump should be removed from the system and properly stored. Instruct the owner to contact the local distributor regarding extended periods of non-use.

**CAUTION:** *Any time an air pump, recirculation pump or electrical test equipment is connected or disconnected, first shut off the power switch located in the Service Pro control center. Failure to do so could result in personal injury or equipment damage. Always insure safe work procedures are followed.*

### **PRELIMINARY ELECTRICAL INSPECTION**

Inspect the control center for damage that might have occurred after its installation. Inspect all visible wiring to and from the control center. Report any damage to the owner at once; it must be corrected before proceeding with electrical testing.

Make sure the circuit breaker which supplies power to the Hydro-Kinetic system in the main electrical service panel is in the "off" position. Open the control center cover and place the power switch in the "off" position. Proceed to the Hydro-Kinetic system and unplug the watertight electrical connectors from the recirculation pump and air pump power cords. Secure the closure caps in position on the electrical connectors and return to the control center.



### **VOLTAGE TEST OF CONTROL CENTER**

Use the multi-meter provided in the Hydro-Kinetic Tool Kaddy to check the voltage in the Service Pro control center. Energize the circuit breaker in the main electrical service panel. Always follow safe work procedures when power to the system is energized.

Place one probe of the meter from the Tool Kaddy in the wire nut connector attached to the black wire and one probe in the wire nut connector attached to the white wire. It should read between 109 and 121 volts. Place one probe of the meter in the wire nut connector attached to the red wire and one probe in the wire nut connector attached to the white wire. The meter should read zero volts.

Place one probe in the wire nut connector attached to the green wire and the other probe in the wire nut connector attached to the white wire. The meter should read zero volts. Once these readings are confirmed, place the power switch in the "off" position, carefully reinstall the insert and proceed to the air pump.

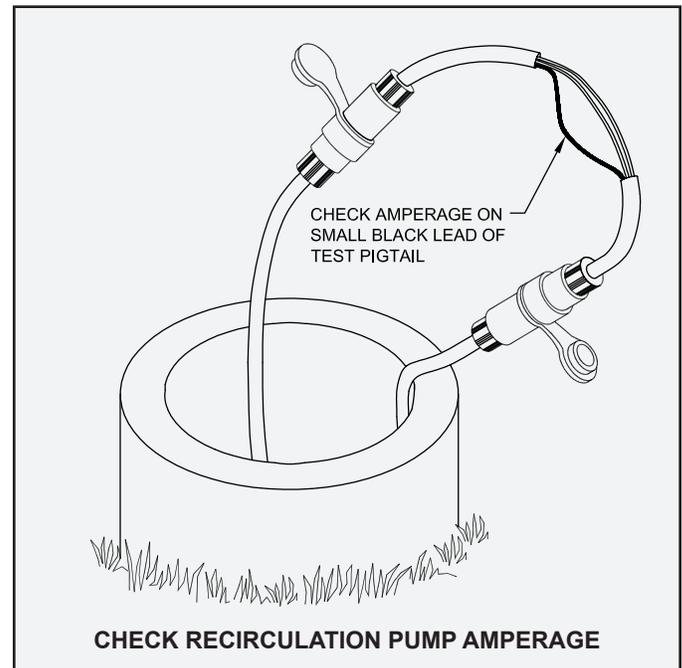
### **VOLTAGE TEST OF AIR PUMP AND RECIRCULATION PUMP**

Remove the polarity tester from the Tool Kaddy and insert it into the receptacle of the air pump electrical connector. When the circuit is energized, the polarity tester should indicate proper wiring of the connector and control center. Remove the polarity tester and insert one probe of the multi-meter into each slot of the electrical connector. It should read between 109 and 121 volts. **CAUTION: Do not energize the system if an electrical problem is found.** Advise the owner and return only when the problem condition has been corrected by a qualified electrician. Repeat the voltage test for the recirculation pump.

# HYDRO-KINETIC® SYSTEM FINAL CHECK & SYSTEM START-UP (Cont.)

## AMPERAGE TEST

Remove the electrical test pigtail from the Tool Kaddy and place the current sensor of the multi-meter around the exposed black lead of the test pigtail. Plug the test pigtail in line between the two halves of the watertight electrical connector of the recirculation pump. When energized, read the current draw of the recirculation pump. The initial reading should never be greater than 6.5 amps. After 48 hours of operation, break-in of the mechanical seals will allow the amp draw to drop to 6.0 amps or less. If an excessive current reading is obtained, de-energize the recirculation pump immediately and do not re-energize it until the cause is found and corrected. When the test is complete, place the control center power switch in the "off" position, unplug the test pigtail at both ends and plug the recirculation pump directly into the receptacle on the underground electrical service cable. Make sure the two halves of the connector are firmly engaged to insure the integrity of the multiple lip seal for a moisture proof connection. Place the power switch in the "on" position.



## AIR PUMP AND PIPING INSPECTION

Remove the vented cover from the aeration chamber riser casting. Check the air pump to make sure it is running smoothly without excessive vibration. Check the diffuser assembly to be sure it is operational and creating a rolling motion of the aeration chamber contents. Replace the vented cover over the aeration chamber riser casting and check for excessive noise. Listen for evidence of debris in the aeration chamber striking the diffuser. Occasionally, discarded construction materials may enter the sewer line and Hydro-Kinetic tank. They must be removed at once so that air delivery from the diffuser is not impeded. Inspect the vent cap openings to assure the unrestricted passage of air.

## RECIRCULATION PUMP AND PIPING INSPECTION

Remove the access cover from the anoxic and clarification chamber riser castings. Check the recirculation pump to make sure it is running smoothly and that the mixing bar is operational. Replace the access cover over the anoxic and clarification chamber riser castings. Listen for evidence of debris in the anoxic chamber striking the mixing bar. Occasionally, discarded construction materials may enter the sewer line and Hydro-Kinetic tank. They must be removed at once so that recirculated liquid from the mixing bar is not impeded.

## INSPECTION OF BIO-FILM REACTOR

Remove the access cover from the Bio-Film Reactor access opening. Inspect the Bio-Film Reactor to be sure that it is installed in a level position and that the locking mechanisms are fully engaged to insure proper operation of the Reactor Elements. Replace the access cover.

## INSPECTION OF EFFLUENT DISPOSAL SYSTEM

Inspect the final discharge point to make sure that the outlet is unrestricted. If you suspect any possibility of a drainage problem, report it to the owner and request that corrective action be taken immediately. The system could be subjected to high water and liquid may back up into the inlet sewer line if not corrected. Locate the ground water relief point and insure it is clean and unobstructed.

When an effluent lift pump or other accessory equipment has been installed as part of the Hydro-Kinetic system, these items must be started-up, and placed into operation at this time. Refer to the individual start-up instructions furnished with accessory equipment and test them accordingly.

## WHEN YOUR INSPECTIONS ARE COMPLETE

Place the power switch in the Service Pro control center in the "on" position. Latch the control center cover and secure it with a tamper evident seal. Notify the owner that the Hydro-Kinetic system is operating properly. Ask if there are any questions regarding system operation. Most start-up problems are caused by improper or incomplete installation of the system or because of a misunderstanding on the part of the contractor or owner. Refer to the Hydro-Kinetic Troubleshooting guide for direction if a problem is discovered during start-up.

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## WASTEWATER TREATMENT SYSTEM

### FINAL INSTRUCTIONS TO THE OWNER

When the initial start-up of the Hydro-Kinetic system has been completed, take a few minutes to review the system and its operation with the owner. Although no owner maintenance is required, several precautions should be taken to insure maximum performance of the system. Emphasize the continued benefits and protection available through the two year limited warranty and prescheduled service inspections which have been included in the purchase of the Hydro-Kinetic system. These instructions, used with a review of the Owner's Manual, will give the owner a basic understanding of the Hydro-Kinetic wastewater treatment system.

#### **PRESCHEDULED SERVICE INSPECTIONS**

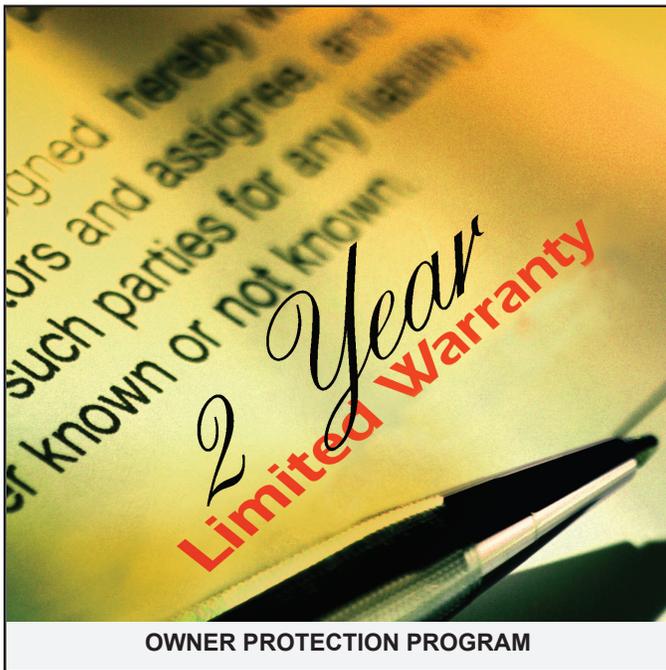
During the initial two years after installation, service inspections will be made as required by local regulations to insure proper system operation. The effluent will be evaluated for color, turbidity, scum overflow and odor. Written reports on the condition of the equipment and results of the effluent quality inspection will automatically be made to the owner and to the local health department. Costs for travel and labor during this period are included in the purchase price of the Hydro-Kinetic system. If improper system operation cannot be remedied at the time of inspection, the owner shall be notified in writing. If emergency service covered by the warranty is needed during the first two year period, it will also be provided at no additional owner expense.

#### **CONTINUOUS OWNER PROTECTION PROGRAM**

At the conclusion of the initial two year period, continued service inspections may be made as required under a Hydro-Kinetic Service Contract available from the licensed distributor for a reasonable charge. Written reports will continue to be made automatically. Costs for travel and labor during service inspections are at no additional charge and emergency service is guaranteed within forty-eight hours. The owner will automatically be mailed a service contract with a letter outlining the advantages of continuing service and a fee quotation before the initial two year period expires.

#### **NO OWNER MAINTENANCE**

No owner maintenance is required on the pumps or electrical controls. System operation and individual components will be thoroughly checked by the service technician during each service inspection. The air pump includes impact-resistant rubber diaphragms and valves. The recirculation pump contains moisture resistant windings securely mounted inside an oil-filled, watertight housing for maximum life. The control center has no user-serviceable parts inside and is secured with a tamper evident seal. Disassembly of any component part will void the limited warranty. Instruct the owner to contact the local distributor with questions and service requests.



**OWNER PROTECTION PROGRAM**

#### **TWO YEAR LIMITED WARRANTY**

The Hydro-Kinetic air pump, recirculation pump and control center are warranted to be free from defects in material and workmanship under normal use and service for a period of two years from the date of system installation, provided the customer completes and returns the Warranty Registration Card to the factory. Registration is important: if the card is not received, the warranty will be recognized in effect for two years from the date the air pump, recirculation pump and control center were shipped from the factory. To qualify for service under warranty, the owner must not disassemble any component part. The defective component must be returned to the factory by the local distributor. It may not be returned directly to Norweco by the owner. The warranty is limited to the replacement of defective parts and does not cover damage resulting from accident, abuse, improper installation, unauthorized disassembly, faulty wiring or failure to follow operating instructions.

## FINAL OWNER INSTRUCTIONS (Cont.)

The owner should be advised to make the following periodic checks of the system to insure that it continues to operate at maximum performance levels:

1. The Service Pro control center should be checked daily. If the red warning light is glowing and the audible alarm sounding, depress the reset button on the control center cover. The light should go off and the audible alarm should be silenced. If the alarms activate again, call the local distributor for service.
2. Check the fresh air openings in each vented cover monthly to make sure the passage of air into the Hydro-Kinetic tank has not been restricted.
3. Inspect the effluent discharge point and ground water relief point monthly to make sure there are no restrictions to the effluent flow.
4. Make sure the pretreatment chamber is inspected at least every three years. Have it pumped only when necessary. See Hydro-Kinetic Tank Pumping instructions to determine when system pumping is required.

### FOR BEST RESULTS

Be sure the owner understands the system's capabilities and purpose. Discuss the importance of the following items with the owner to maximize system performance.

#### Always

1. *Repair any leaking faucets or toilets promptly.*
2. *Discharge only biodegradable wastes into the system.*
3. *Divert down spouts and other surface water away from the system.*
4. *Keep riser covers accessible for service and inspection.*
5. *Consult your Norweco distributor before using enzymes, tank activators or similar additives.*
6. *Call your Norweco distributor if you have problems or questions.*

#### Never

1. *Connect roofing down spouts, footer drains, sump pump piping or garage and basement floor drains into the sewer line of the Hydro-Kinetic system.*
2. *Allow backwash liquid from a water softener to enter the system.*
3. *Dispose of items such as lint, cooking grease, scouring pads, diapers, sanitary napkins, cotton balls, cotton swabs, cleaning rags, dental floss, strings, cigarette filters, rubber or plastic products, paints and thinning agents, drain cleaners, gasoline, motor oil or other harsh chemicals in the domestic wastewater plumbing.*
4. *Dispose of disinfectants, pesticides, poisons or toxic materials down your drain.*
5. *Use the power supply to the air pump or recirculation pump as a service receptacle for lawn and garden tools.*
6. *Interrupt power to the Hydro-Kinetic control center, even during extended periods of non-use. If you anticipate a long term vacancy, contact the local distributor for proper procedures.*

### BEFORE LEAVING THE SITE

Remind the owner that the limited Warranty Registration Card must be filled in and mailed as soon as possible. Explain that your company's telephone number is found on the Service Pro control center. Offer to remove and return the Warranty Registration Card for the owner. Have them sign the card and return it to your office to be mailed to Norweco. As you leave, remind the owner to call your office if any questions arise.

**PROGRESS THROUGH**

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# ***norweco***® **HYDRO-KINETIC**®

## **WASTEWATER TREATMENT SYSTEM**

# **SERVICE PROGRAM AND RECORDKEEPING**

Complete and detailed installation and service records must be kept on each Hydro-Kinetic system. Properly maintained records will enable you to determine, at a glance, the history and condition of each system sold. Keep all installation and service records filed as outlined herein so that you will have immediate access to this information. Following these procedures allows efficient organization of service inspection dates and service policy mailings. Their use will enable you to provide complete and professional service to your Hydro-Kinetic customers.

### **INITIAL ORDER RECORDS**

When a Hydro-Kinetic system order is received, the following information should be recorded on your delivery slip: customer's name, address and telephone number, equipment ordered (including system model number and optional equipment such as ultraviolet or Blue Crystal disinfection system, Bio-Neutralizer dechlorination system or risers) directions to the site, delivery date and time requested. Give this information to the dispatcher for delivery truck scheduling.

### **ASSIGN COMPONENTS FROM STOCK**

To begin processing the order, select an equipment package from your stock. The equipment package includes an air pump, a recirculation pump and control center with serial numbers that have been recorded at the factory as a matched set. These components should be installed together for proper recordkeeping. Attached to the air pump is a copy of the three-part warranty registration card and a red warning tag. Make sure that the model number and serial number on the outside of the air pump shipping carton matches the air pump nameplate and all three sections of the registration card. Give the control center and enclosed literature packet to the tank delivery driver.

Do not remove the air pump, recirculation pump or plumbing from the original equipment package shipping carton. Close the carton and identify it on the outside with the name and address of your customer so that the matching air pump, recirculation pump and control center will be installed. Store the equipment package carton in your plant until the customer requests installation and start-up.

### **TANK INSTALLATION RECORDS**

When the Hydro-Kinetic tank and controls are installed, the contractor or owner should sign an itemized delivery slip. Tear off the bottom portion of the three-part card attached to the air pump in the equipment package carton. One service and warranty record card should be filled out with the tank setting date, owner's name, address and telephone

number, contractor's name, directions to the jobsite, a description of the installation, optional equipment installed and location of the tank and control center. Other service and warranty record cards for the same system should be attached to the completed card. All service and warranty record cards should be returned to your office and kept until the system is ready for start-up. Leave the remaining two portions of the three-part card intact and store them with the Hydro-Kinetic Owner's Manual.

### **RECORDS OF SYSTEM START-UP**

When air pump and recirculation pump installation is scheduled, give all service and warranty record cards to your installer. These cards contain all information needed to perform start-up services. The date of air pump installation and start-up should be filled in and these cards returned to the office when the air pump and recirculation pump have been installed.

### **HYDRO-KINETIC CUSTOMER MASTER FILE**

When the Hydro-Kinetic system start-up is complete, transfer the owner's name, address, telephone number, system model number, serial number for the air pump, serial number for the recirculation pump, and system installation date from the service and warranty record card to a standard 4 x 6 file card. Place all cards alphabetically by owner name in the Hydro-Kinetic master file. The file should contain one card for each Hydro-Kinetic system installation. It must be updated whenever an exchange air pump and/or recirculation pump is installed or when a change in system ownership occurs.

### **HYDRO-KINETIC SERVICE FILE**

File each original service and warranty record card in the Hydro-Kinetic service file. The service file should be set up on the first month you begin to install and start-up Hydro-Kinetic systems. Make a divider tab which has visible the number "1" on it. File the service and warranty record card for each system placed into operation this month ahead of this divider "1" tab. On the first day of the

## SERVICE PROGRAM AND RECORDKEEPING (Cont.)

second month, make a new divider tab titled "2." File this divider behind the first one and move all registration cards filed last month to a new position in front of divider #2. Place all record cards for installations started-up in this, your second month, ahead of divider #1. On the first day of each succeeding month, a new divider must be placed at the end of the file, then all cards moved back one divider, then all new installation cards for the current month filed ahead of divider #1. Do not file current installation cards prior to advancing the previous month's cards.

### SCHEDULING SERVICE INSPECTIONS

Service inspections are to be completed for the first two years after the system has been installed. They are scheduled after twelve and twenty-four months, or as required by local governing regulations. To determine which systems are due inspections each month, update the Hydro-Kinetic service file with a new month divider on the first day of the month and remove all cards from behind divider tabs 12 and 24. Fill out one three-part service inspection record card for each system with system model number, air pump and recirculation pump serial numbers, county, owner's name, address and directions to the site. Be sure this information is duplicated on all three sections of the service inspection record card. The other side of the card will be filled out by the service technician at the site. If this is to be the 24th month inspection and the system owner has not renewed and returned a service contract, check the box on all three portions of the card indicating that the service policy on this system has expired. Give the service inspection record cards to the service manager.

Your service technicians must fill in the remaining items on both sides of each card as they make the inspections. The top portion is torn off and left with the system owner. The lower two portions are returned to the office. The middle portion of the card is for health department notification. Most health departments prefer that these cards are collected by the distributor and mailed in monthly rather than individually.

The bottom portion of the service card is retained for your records. It should be filed behind the service and warranty record card for that installation. This allows all records of service inspections for each installation to be filed together. As you file the service inspection cards, you should update the service and warranty record card with the date and results of your inspection.

### EMERGENCY SERVICE CALLS

Occasionally you may be asked to service a Hydro-Kinetic system in advance of its next prescheduled inspection. When the request for service is taken, look up the service and warranty record card in the service file. Use it to prepare a new three-part service inspection card and check the box for "Special Service Call." This service inspection

card must be completed by your service technician and returned to your office. When it is returned, the check for "Special Service Call" signifies that the service and warranty record card for this installation probably will not be found following a divider tab scheduled for service this month. When the record card is located, fill in the service call date for the next prescheduled inspection and file the service card in chronological order behind the service and warranty record card. When the next prescheduled inspection for this system is due, service will be considered complete.

### MAILING SERVICE POLICIES

Initial Hydro-Kinetic system service is in effect for the first twenty-four months of system operation. After that time the owner is invited to continue routine service for their Hydro-Kinetic system on an annual basis. Service contracts should be mailed in the twenty-second month of system operation. After updating the service file at the beginning of each month, remove all service and warranty record cards from behind divider tab #22 and mail a service



contract and cover letter to each system owner. Follow-up each mailing to owners who have not responded to your 22nd month notice by re-mailing to all service and warranty record cards behind divider tab #23 whose contracts have not been renewed. Record the dates of these mailings on the registration card.

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# HYDRO-KINETIC®

## WASTEWATER TREATMENT SYSTEM

# SERVICE PROGRAM AND RECORDKEEPING (Cont.)

### RENEWED SERVICE POLICIES

If an executed service contract and fee are received by the end of the two year service period, the service and warranty record card (followed by the completed service inspection cards) is retained in the service file. Service policy inspections after the initial two year program are performed in the same fashion as initial inspections. Cards each month from behind divider tabs 12 and 24 and from behind tabs which are multiples of twelve: 36, 48, 60, 72, etc. are used to schedule routine service for the month. Fill out three-part service cards for each installation and continue to file completed service inspection cards chronologically behind individual service and warranty record cards. Remember to update the service and warranty record cards for each installation as service contract inspections are performed.

Continued service policies are renewed annually. Renewal service contracts should automatically be mailed in their tenth month. They should be done monthly when initial service contracts are mailed to owners in the twenty-second month of Hydro-Kinetic system operation. In any given month, service contracts due to expire in two months will be located behind divider tabs #34, 46, 58 and so forth. Second mailings may be made from cards located behind divider tabs #35, 47, 59, etc. excluding those whose renewal contracts have been returned.

Executed service contracts should be filed alphabetically by owner's name in a separate file. Multiple copies for owners who consistently renew their contracts should be attached to each other and organized chronologically.

### LAPSED SERVICE CONTRACT RENEWALS

From time to time an owner may wish to renew a service contract which had been permitted to lapse. When the executed contract and fee are received, remove the service and warranty record card, with all service cards, from the alphabetical master file. Only the 4 x 6 master card should remain. Refile all other cards in the active service file behind the divider tab it would have been found in, according to system age as if the service policy had been continuously in force. This filing order will allow you to use the procedures already established for service scheduling and renewal policy mailings.

### INSTALLATION OF REPLACEMENT AIR PUMP OR RECIRCULATION PUMP

When an owner uses the two year limited warranty to receive a new air pump or new recirculation pump for their Hydro-Kinetic system, the two year limited warranty and the two year initial service program do not begin again. No service is performed unless a service contract is in effect. When the replacement air pump or recirculation pump is installed, the new serial number should be recorded on the supplemental service record section of the service and warranty record card in the Hydro-Kinetic customer master file or service file, whichever is appropriate. Note on the existing card the new air pump or new recirculation pump installation date. Record the replacement pump serial number and installation date on the 4 x 6 card in the alphabetical master file. It is important that the original Hydro-Kinetic system installation information from the service and warranty record cards be retained for installations with replacement pumps, because future determinations of pump warranty will be based upon the original system start-up date.

### INACTIVE HYDRO-KINETIC INSTALLATIONS

If an executed service contract and fee are not returned by the end of the twenty-fourth month of system operation, the installation is considered inactive. Its service and warranty record cards and all service cards must be removed from the active service file. They are refiled behind the alphabetical listing card in the Hydro-Kinetic customer master file. Inactive cards remain in this file unless the owner executes a new service contract at a later date. All renewed service contract holders whose contracts lapse must also have their cards transferred to the alphabetical file. If an owner requests service on an out-of-warranty system, service should be performed on a time and materials basis. A three-part service card must be completed as usual and the distributor's copy should be returned to the office and filed in order behind the last service card for the installation.

DEAR OWNER:

**HYDRO-KINETIC®**  
WASTEWATER TREATMENT SYSTEM

Dear Owner:

When you purchased your Norweco Hydro-Kinetic wastewater treatment system, a two year limited warranty was included in the purchase price. The purchase also provided for a two year service inspection program at no additional cost to you.

We are pleased to be able to offer a continuing service program similar to the one originally included with your system, now that your initial service program and limited warranty have expired. Our continuing policy ranges of the way from routine inspections and emergency service to owner limitation on labor costs. We have enclosed a complete copy of our renewable service contract, with costs for your system, for your review and consideration.

We would be happy to answer any questions regarding the renewable service program or any other questions you may have regarding operation and maintenance of your Hydro-Kinetic wastewater treatment system. Please take the time to review and consider the advantages of the service contract we have enclosed. As in the past, our company also continues to offer service and repair for systems on a "fee needed" basis in the areas we serve. Thank you.

Sincerely yours,  
Your Local Licensed Norweco Distributor

NORWECO, INC. - NORWALK, OHIO - USA

**norweco**  
**HYDRO-KINETIC®**  
SERVICE CONTRACT

OWNER'S NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

TELEPHONE NO. ( ) \_\_\_\_\_

DIRECTIONS: \_\_\_\_\_

EFFECTIVE DATE: \_\_\_\_\_ 20

EXPIRATION DATE: \_\_\_\_\_ 20

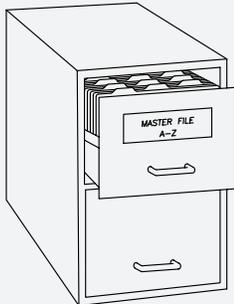
SYSTEM INSTALLED ON: \_\_\_\_\_ 20

This one year service contract for the Hydro-Kinetic wastewater treatment system located at the address specified above is intended to enable the owner to economically obtain regular service inspections for the Hydro-Kinetic unit, as well as non-scheduled special service that may be required by a technician. When this contract is in force, the owner will not be charged for any major service required under the terms of this service agreement. A technician will regularly inspect the plant or require repair within a 48-hour period. The contract and remain in effect for a period of one year, as specified in the above and expiration dates listed above.

PLEASE CONSIDER

# THREE SIMPLE FILES PROVIDE AUTOMATIC SERVICE SCHEDULING

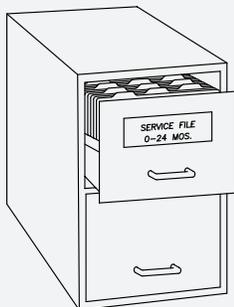
Detailed and accurate record keeping guarantees efficient service performance, reduced man-hours and increased profits.



**MASTER FILE**

Contains a 4 x 6 file card for each installation which:

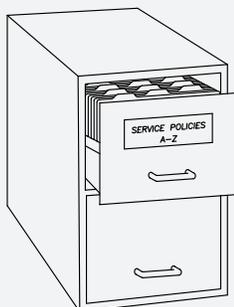
- Lists owner's name, address and telephone number
- Lists system installation date, model number and serial numbers
- Is updated when ownership changes
- Is updated when a replacement air pump or recirculation pump is installed
- Is followed by service and warranty record card and all service inspection cards for inactive installations



**SERVICE FILE**

Contains monthly divider tabs used to:

- File service and warranty record cards by month of installation for in-warranty components
- File all service and warranty record cards for out-of-warranty systems with continued service policies



**SERVICE POLICY FILE**

Contains all executed service contracts for each Hydro-Kinetic installation filed:

- In alphabetical order by owner's name
- In chronological order by contract effective date

**PROGRESS THROUGH**

***norweco***<sup>®</sup>  
www.norweco.com

**SERVICE SINCE 1906**

# ***norweco***® **HYDRO-KINETIC**®

## **WASTEWATER TREATMENT SYSTEM HYDRO-KINETIC® SYSTEM AND CONTROL CENTER SERVICE**

To maximize owner protection, the Hydro-Kinetic wastewater treatment system is backed by a two year limited warranty on system components. The initial selling price includes prescheduled service inspections, as required by your local governing regulations, which cover the first two years of system operation. These service inspections should completely familiarize the owner with the Hydro-Kinetic wastewater treatment system and answer any questions that arise. Carefully check all component parts of the Hydro-Kinetic system to insure proper operation and overall wastewater treatment quality. Regular service inspections by qualified technicians establish an excellent relationship with the owner as well as with local health officials. They must be performed faithfully to keep you up-to-date on the performance of each Hydro-Kinetic system you have installed.

While making service inspections during the initial two year period, be sure to explain to the owner that they are being performed at no charge and that the same coverage can be renewed on a continuing basis at a nominal charge following the initial two year program. Point out the advantages of continuous protection with the service contract. Be sure to remember that service contract sales have advantages for the distributor as well. They result in more efficient service inspection scheduling with more actual "service time" and less "travel time" per day. These savings can be passed on to the owner through more attractive renewal contract fees in future years.

All of the equipment and tools needed for Hydro-Kinetic system service work are contained in the Hydro-Kinetic Tool Kaddy. You will also need exchange air pumps and recirculation pumps. If the system includes optional chemical treatment downstream of the Hydro-Kinetic filter, a supply of Blue Crystal disinfecting tablets and a supply of Bio-Neutralizer dechlorination tablets will also be required for service.

### **HYDRO-KINETIC SYSTEM SERVICE PROVIDES CONTINUOUS OWNER PROTECTION WITH THESE ADVANTAGES**

- Travel and labor costs during service inspections are provided at no charge to the owner.
- Special service calls that may be necessary during the program are performed at no charge to the owner.
- Owner's investment, property and the environment are fully protected.
- Guaranteed response to emergency service requests is made within forty-eight hours.
- Local health department is automatically notified of system condition by the distributor.
- Owner has an up-to-date, written record of the condition of the air pump, recirculation pump, control center and Hydro-Kinetic filter.
- Owner is continuously informed of the treatment quality provided by the system.
- Routine maintenance is performed by factory-trained service technicians; no owner maintenance is required.
- Owner can expect maximum air pump life and minimal power consumption costs due to regular, qualified service visits.

These instructions are designed to cover the important points of Hydro-Kinetic system operation which should be checked during each service inspection. They have been arranged in normal service order to assure that you make the most efficient use of your time. While a visual check is normally sufficient to be certain that each item is in proper working order, several items listed in this manual are indications of potential problems. If anything unusual is encountered, refer to the Hydro-Kinetic Troubleshooting Guide.

# NORWECO PRESCHEDULED SERVICE INSPECTIONS (Cont.)

## Before you leave your plant

- Be sure you have a complete list of service needs in the area you are going to work.
- Check to see that you have detailed directions to each installation.
- Be sure your service vehicle is fully stocked.

## When you arrive at the site

- Meet the owner. Introduce yourself and present your business card.
- Explain the service inspection program and outline what you will do. Mention that your services are at no charge.
- Ask for permission to inspect the Service Pro control center and Hydro-Kinetic tankage.
- Make sure the owner has a copy of the Owner's Manual, serial number tag and previous Service Inspection Record Cards.
- Suggest that the owner record the information from the Service Inspection Record Card in the Supplemental Service Record Section of the Owner's Manual.
- Ask if there are any questions concerning the system or its operation.

## CONTROL CENTER SERVICE

**CAUTION: If your visual inspection of the Service Pro control center reveals a problem, be sure to shut off the appropriate circuit breaker in the main service panel - then test all circuits with the electrical multi-meter to be sure they are de-energized before proceeding.**

1. If there is no evidence of an electrical problem, check the main service panel to see that the circuit breaker for each Hydro-Kinetic system is turned on.
2. Make sure the panel is turned on. If there are any alarm lights activated, refer to the Service Pro Model 801P Quick Start Guide for further diagnostic instructions.
3. See that your company's identification label is affixed to the Service Pro control center and is legible. Replace the label if necessary.
4. Make sure that the air pump serial number tag is attached to the air pump or has been stored by the owner in a secure location. If it has been misplaced, provide a new one and fill in the appropriate information.
5. See that the Owner's Manual has been stored by the owner in a secure location. If it has been misplaced, supply the owner with a new one.
6. Inspect the wiring from the control center to the air pump and recirculation pump, as far as it is visible, and notify the owner if you see any damaged areas.
7. As you leave, make sure the Service Pro control center is turned on and there are no active alarms. Secure the Service Pro control center with a new tamper evident seal.
8. Make appropriate notations on the condition of the control center on the Service Inspection Record Card.

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# ***norweco***® **HYDRO-KINETIC**®

## WASTEWATER TREATMENT SYSTEM

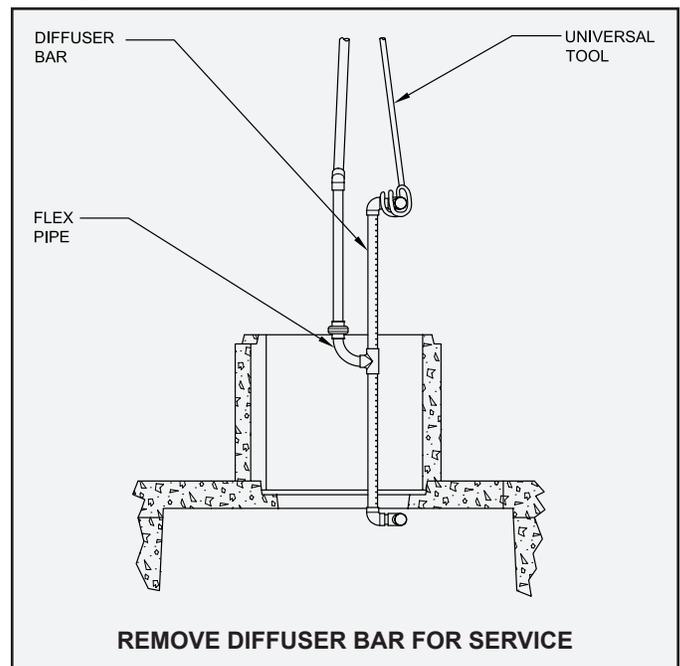
# AIR DELIVERY AND RECIRCULATION SYSTEM SERVICE

The Model A100 air pump, diffuser assembly, Model SD103 recirculation pump and mixing bar assembly have been specifically designed for use in the Hydro-Kinetic system. The air pump and diffuser provide maximum air introduction to the aeration chamber, while the recirculation pump and mixing bar provide thorough mixing of the anoxic chamber contents to assure reliable, economical wastewater treatment. The air pump can be remotely mounted or installed in the access riser above the aeration chamber. Only the plastic diffuser assembly and air piping are submerged. The recirculation pump is installed in the bottom of the clarification chamber. The pump transfers a portion of the wastewater back to the anoxic chamber through a prefabricated mixing bar assembly. Unauthorized tampering or repair of the air pump or recirculation pump will void the warranty.

**CAUTION: Any time an air pump, recirculation pump or test equipment is connected or disconnected, first shut "off" the power switch in the control center. Failure to do so could result in personal injury or equipment damage.**

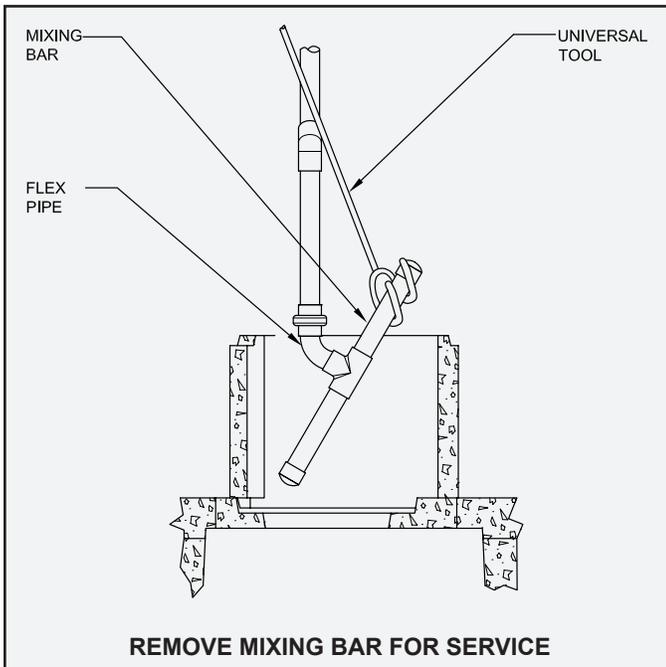
### AIR DELIVERY SYSTEM SERVICE

1. As you approach the Hydro-Kinetic tank, listen for excessive noise before removing the vented cover.
2. Remove the vented access cover located above the aeration chamber and place it aside. The air pump should be operating normally.
3. Manually check the air pump for excessive vibration. Inspect the vent cap and air pump for objects, plants, insects or debris that could impede the air intake. Remove these items if present.
4. Check the aeration chamber for odor. A musty odor indicates the presence of aerobic conditions essential for good treatment. A septic odor indicates inadequate aeration, suggesting that the passage of air into the tank contents has been restricted.
5. Check the aeration chamber and insure the diffuser assembly is creating a rolling motion of the chamber contents. If a rolling motion is not visible, verify the air pump is operating properly.
6. Move the power switch in the control center to the "off" position. Inspect the outside of the electrical connector assembly for worn spots. Uncouple the connector and check for any evidence of moisture inside. Secure the closure cap over the female half of the connector to keep it clean and dry while you work.
7. Unscrew the diffuser drop pipe assembly from the air pump at the union and remove the air pump from the mounting riser. Place the air pump on the vented cover.
8. Remove the air pump concrete mounting pad.
9. Within 2-3 minutes after turning off the air pump, perform a settleable solids test of the aeration chamber contents. Refer to Hydro-Kinetic Tank Pumping instructions for details.
10. Check the power cord from the moisture-resistant electrical connector to the air pump. Be sure it is free of nicks or worn spots.
11. Check to see if there is a water mark on the outside of the air pump and notify the owner if one is found. A high water mark indicates a problem in the effluent disposal line, disposal field or elsewhere in the installation. If left uncorrected, wastewater could back up into the tank, void the warranty and eventually flood the facility.
12. Check the air filter and clean or replace as required.
13. Remove and clean diffuser assembly if necessary. Use the hook attachment on the universal tool to guide the diffuser bar out of the aeration chamber riser.
14. Check the aeration chamber for the presence of non-biodegradable materials, paper, mop fibers, hair, grease or oil. A significant accumulation of these materials in the aeration chamber indicates the pretreatment chamber should be evaluated. Refer to Hydro-Kinetic Tank Pumping instructions for details.



## AIR DELIVERY AND RECIRCULATION SYSTEM SERVICE (Cont.)

15. Inspect the underground power cable in the air pump mounting riser for breaks or scars in the insulation. Examine the inside of the riser casting for evidence of ground water entry.
16. Carefully reinstall the air pump on the concrete mounting pad in the aeration chamber riser.
17. Using a multi-meter, check the voltage at the electrical connector. The meter should read 115 volts  $\pm$  5%. Record the voltage on the Service Inspection Card.
18. Wipe the electrical connector with a clean, dry cloth to remove moisture or dirt accumulated during service. Plug the electrical test pigtail in between the male and female electrical connectors and check the amperage of the newly serviced air pump. The air pump should not draw more than 1 amp. Record the amperage on the Service Inspection Card.
19. Reinstall the access cover on the aeration chamber mounting riser.



### RECIRCULATION SYSTEM SERVICE

1. Remove the anoxic chamber access cover and place it aside. Check to insure the mixing bar is operational.
2. If the mixing bar requires service, use the hook attachment on the universal tool to guide the mixing bar out of the riser.
3. Remove the clarification chamber access cover and place it aside. The recirculation pump should be operating normally. The recirculation pump operates on a pre-programmed on/off cycle, so press the reset button if necessary to verify operation.
4. Inspect the flow equalization device. Rinse the design flow, sustained flow and peak flow ports with a garden hose and insure they are free of debris. Clean the flow ports with a soft-bristled brush if necessary.
5. Check the surface of the clarification chamber for grease or biologically untreatable material. A

significant accumulation of these materials indicates the pretreatment chamber should be evaluated to determine if pumping is required. With the air pump running, use the hopper scraping tool to gently scrape all areas of the clarification chamber hopper. Scrape all the way down to the bottom of the chamber. Then scrape the small flat area at the bottom of the hopper, pushing toward the aeration chamber as far as possible.

6. If necessary, use water to wash away any sludge from the inside of the system riser casting, access cover and surrounding grass or landscaping.
7. Note the liquid level in the clarification chamber. If the liquid level is above the flow line of the outlet coupling, consult the troubleshooting guide to determine if there is a problem with drainage. Improper drainage will lead to flooding of the Hydro-Kinetic wastewater treatment system and must be reported to the owner. Examine the inside of the access riser for evidence of surface water entry.
8. Examine the condition of the Hydro-Kinetic tank outlet coupling. Any debris that has accumulated inside of the tank outlet coupling must be removed to insure proper system operation.
9. Reinstall the clarification chamber access cover.
10. Make the appropriate notations regarding the air pump, recirculation pump, flow equalization device, the results of the settleable solids test and related items on the Service Inspection Card.
11. Proceed with Hydro-Kinetic filter service as outlined in Hydro-Kinetic Filter and Media Service instructions. When the service is complete, return the power switch in the control center to the "on" position. Close the cover of the control center enclosure and secure it with a new tamper evident seal.

### IF AN AIR PUMP OR RECIRCULATION PUMP MUST BE REPLACED

The service technician should be able to restore most installations to full operation during the initial service call. If the air pump or recirculation pump is no longer eligible for the two year limited warranty, the air pump or recirculation pump should be removed and replaced with an exchange unit from your rotating stock. This will become the permanent air pump or recirculation pump in service at the facility and your company's service records should be updated to reflect the new air pump or recirculation pump serial number. If the serial number portion of the Warranty Registration Card is still attached to the air pump, be sure to fill in the new serial number for the owner.

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# ***norweco***® **HYDRO-KINETIC**®

## WASTEWATER TREATMENT SYSTEM

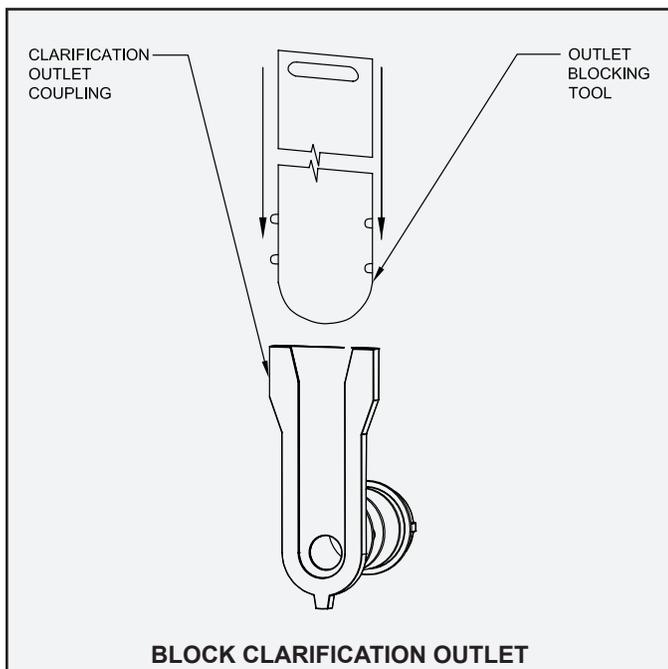
### HYDRO-KINETIC BIO-FILM REACTOR SERVICE

Check operation of the Service Pro control center and complete all Hydro-Kinetic Air Delivery and Recirculation System Service instructions before proceeding with Hydro-Kinetic Bio-Film Reactor service. The Bio-Film Reactor provides final treatment of the system effluent to a near pristine state. In order to insure this high quality effluent, it is essential that the settled solids in the Bio-Film Reactor are pumped to the pretreatment chamber during system service.

**CAUTION: Anytime an air pump, recirculation pump or service pump is connected or disconnected, first shut off the power switch in the control center. Failure to do so could result in personal injury or equipment damage.**

#### EQUIPMENT REQUIRED FROM THE TOOL KADDY

- water hose and spray nozzle
- service pump and hose
- outlet blocking tool
- rubber gloves
- safety face shield or goggles



A fresh water supply is required for cleaning and servicing the Hydro-Kinetic Bio-Film Reactor.

1. Remove the access covers from the pretreatment chamber, clarification chamber and Bio-Film Reactor. Check the condition of the Bio-Film Reactor and the liquids in the tank for color and odor. Note the condition of the system on the Service Inspection Card.
2. With the flow equalization device in place, install the outlet blocking tool in the clarifier outlet coupling prior to pumping the Bio-Film Reactor. This will prevent loss of liquid from the upstream treatment tank.

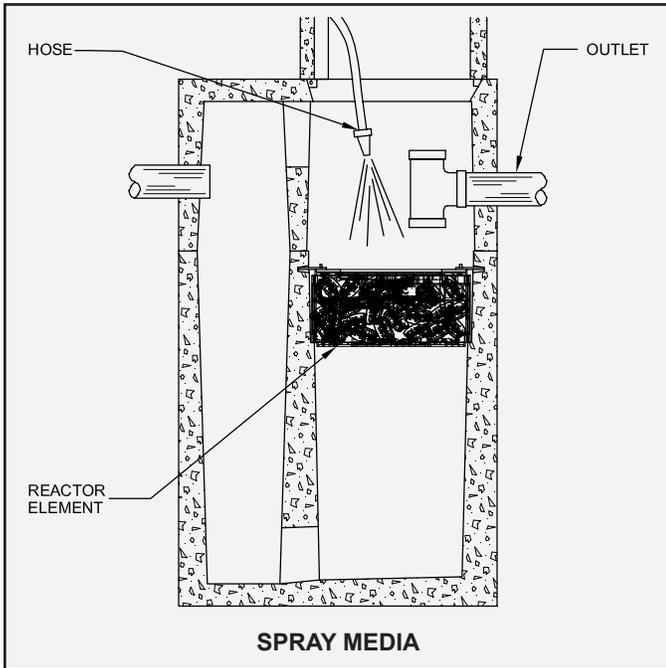
3. Place the intake of the service pump at the bottom of the influent chamber. Place the opposite end of the hose into the pretreatment chamber opening of the upstream system. Pump the contents from the bottom of the Bio-Film Reactor until the accumulated solids are completely withdrawn and the water level is below the bottom of the Reactor Elements. Approximately 150 gallons will be removed.
4. Use a water hose and spray nozzle to rinse off the Reactor Elements and attached growth media. Continue spraying until all sludge and wastewater have been flushed from the media. Rinse away debris that has accumulated on the effluent chamber walls.
5. If necessary, use water to wash away any debris from the inside of the system mounting riser, access cover and surrounding grass or landscaping.
6. Reinstall the pretreatment chamber and Bio-Film Reactor access covers. Clean and store all tools.
7. Remove the outlet blocking tool and allow the filter to refill to normal operating level. Be sure to never leave the Bio-Film Reactor empty after pumping.
8. When the service is complete, return the power switch in the control center to the "on" position. Close the cover of the control center enclosure and secure it with a new tamper evident seal.

#### REACTOR ELEMENT REMOVAL

In the unlikely event that the Reactor Elements cannot be adequately cleaned using normal maintenance spraying, removal from the tank may become necessary.

1. Excavate to the top of the Bio-Film Reactor tank to expose the rectangular access openings. Remove the access openings and set them aside.
2. Remove the outlet tee. It is not glued in place.
3. Use the disassembly tool to turn the locking mechanisms inward on the Reactor Elements until they clear the locking ledge.
4. Thread the removal hook tool to the shaft of your universal tool. Insert the two hooks of the tool in the fourth square opening from the side wall of the tank.

## HYDRO-KINETIC FILTER AND MEDIA SERVICE (Cont.)



**NOTE:** An effluent “grab” sample allows a visual assessment and should only be used in conjunction with routine service and/or troubleshooting procedures to accurately evaluate system operation. A “composite” sample, collected over 24 hours of system operation, preserved and transported using USEPA established procedures, is necessary if laboratory analysis of the effluent is to be performed. Laboratory analysis of an effluent “grab” sample can lead to misleading conclusions about system operation and should not be conducted. For further information regarding proper evaluation techniques for sampling onsite systems, refer to the Norweco Technical Bulletin EFFLUENT SAMPLING TECHNIQUES FOR RESIDENTIAL TREATMENT SYSTEMS.

4. Make appropriate notations on the condition of the plant effluent and disposal system on the Service Inspection Card.

### BEFORE YOU LEAVE THE FACILITY...

5. Lift the Reactor Element from its position by imparting an upward force. Remove the remaining reactor from the tank using the same method through the opposite access opening.
6. Place the Reactor Elements in the service bag provided with your Tool Kaddy to return to your shop for cleaning. Install new or refurbished Reactor Elements in the Hydro-Kinetic Bio-Film Reactor.
7. Using the disassembly tool, turn the locking mechanisms outward on both Reactor Elements until they are secure under the locking ledge.
8. Reinstall the outlet tee. Replace the rectangular access covers on the tank top and backfill the excavation. Be sure to slope grade away from the riser.

### EFFLUENT DISPOSAL SYSTEM CHECK

1. Determine if the effluent from the system is being carried to an outlet for surface and/or subsurface discharge, or if it is being disposed of onlot. Inspect the condition of the effluent disposal system and make appropriate notations on the Service Inspection Card.
2. Although the system effluent may be discharged and disposed of in several acceptable fashions, there should always be a ground water relief point installed in the effluent line. It should be located at a point no higher than the outlet invert of the tank. It will prevent flooding in cases where the disposal line is submerged or saturated with ground water. Locate the ground water relief point and be sure that it is free of obstructions.
3. Locate the point of discharge closest to the system outlet. A free-falling “grab” sample of effluent can be collected after the point of discharge has been thoroughly cleaned. Take note of effluent color, odor and the presence or absence of suspended particles. Accumulation of mud can be a sign of a crushed or broken effluent line and should be reported to the owner.

1. Make sure that both sides of all three Service Inspection Cards are properly and completely filled out, including any specific notes or special services that your inspection indicates are needed.
2. Leave the top section of the Service Inspection Card with the owner and provide a brief verbal explanation of the condition of the system. Advise when to expect your next routine visit and provide your business card with office phone number, should the owner have any questions.
3. Point out the advantages of a continued service policy if the current Hydro-Kinetic system service policy is nearing expiration.
4. Explain that the recirculation pump is set to operate on a time cycle and should not be turned off even during extended periods of non-use. Explain that the control center contains no user-serviceable parts and that the cover is secured with a tamper evident seal for owner protection and protection of component parts.
5. Review the operation of the red warning light and audible alarm on the Service Pro control center with the owner. Inform the owner that the control center should be checked daily to insure proper system operation. Explain that if the light glows and the alarm sounds, it could be due to temporary high water or electrical power fluctuation and that the reset button should be pushed to see if normal operation is resumed before requesting service. If the owner is not home, leave the top section of the service card at the owner’s door.

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## WASTEWATER TREATMENT SYSTEM

### AIR PUMP REPAIR KIT INSTRUCTIONS

The air pump repair kit is provided so that repair of the Model A100 air pump may be accomplished economically if required. Air pump repair should be done only by a factory-trained technician, and should be performed at your place of business rather than at the installation site. Active systems require an air pump at all times and should be loaned a spare during the pump repair period. Replacement of a properly functioning air pump will not improve operational performance.

The air pump replacement kit contains the following items to be used during replacement:

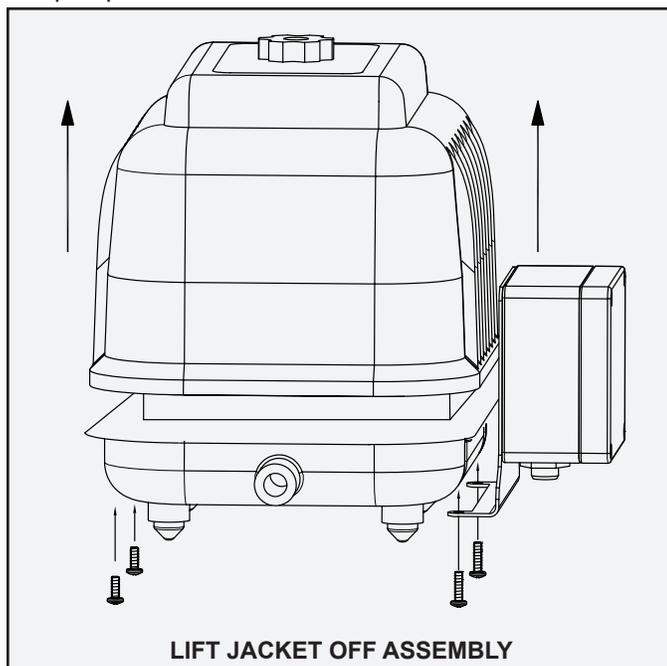
- Two diaphragms
- Four flapper valves
- Four plastic slip washers
- One bottom pressure chamber gasket

The following equipment is required:

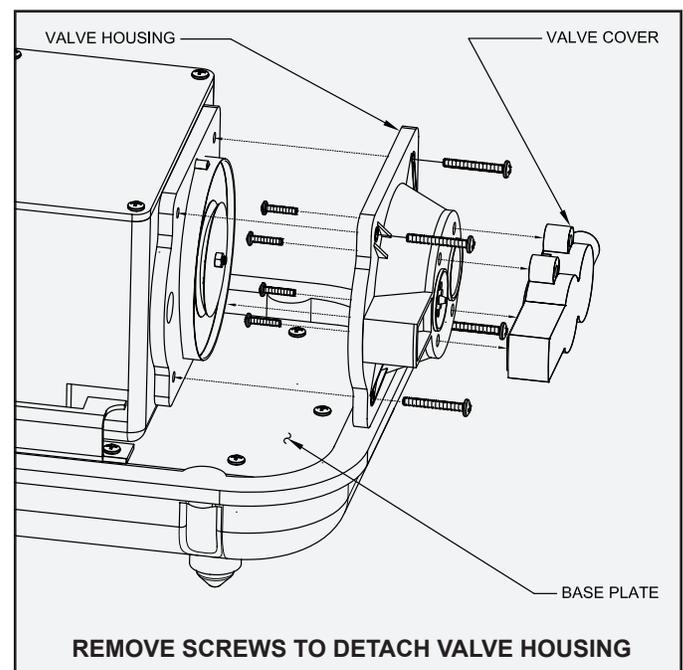
- Phillips head screw driver
- Small adjustable wrench
- Clean working space
- Soap and a clean water source

#### REPLACEMENT DIAPHRAGM INSTRUCTIONS

1. Disconnect the air pump from the AC receptacle and from plumbing. **CAUTION: Always unplug the unit from its power source before it is removed or disassembled for service.**
2. Remove the pump from the riser and relocate to an uncluttered workspace with access to clean water.
3. Remove the top hand screw and cover from the air pump. Clean the inlet filter and reinstall.

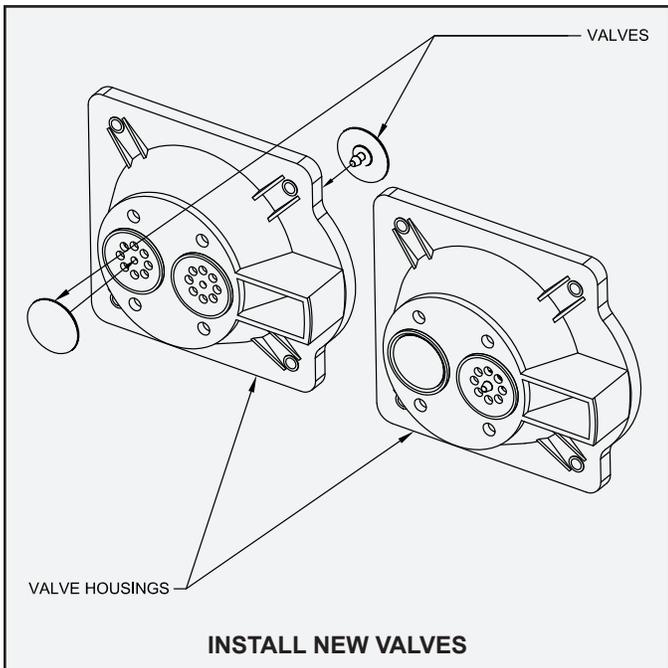


4. Remove the four screws located along the bottom of the outer jacket. Remove the pressure switch enclosure and lift the outer jacket straight off the assembly. Set the screws aside. The pump motor can remain fastened to the base plate during service.

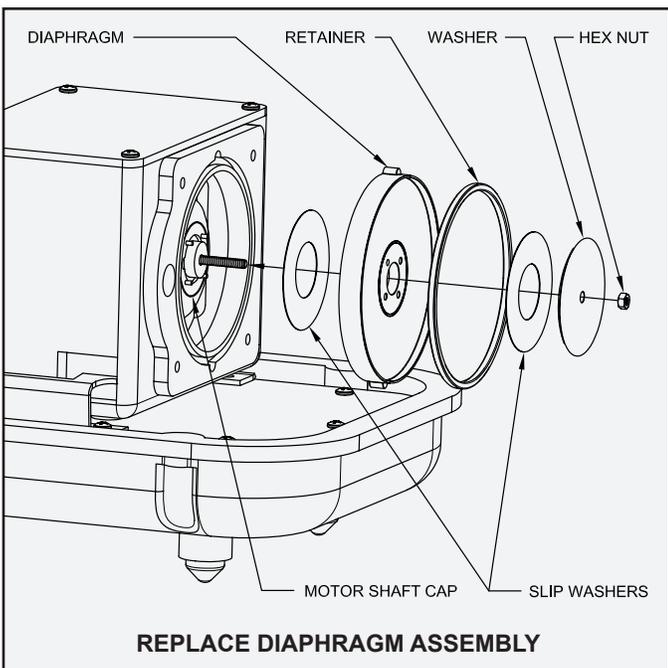


5. Detach the hoses on both sides by squeezing the spring clamps and gently pulling the hose off of the fitting. Remove the four corner screws from each valve housing to remove the assemblies. Use care to insure the screw heads are not stripped. Set the screws aside.

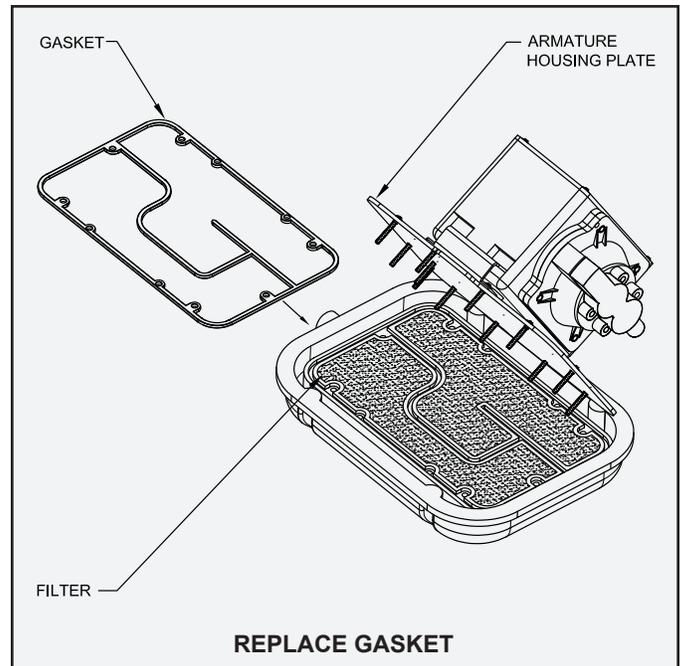
## AIR PUMP REPAIR KIT INSTRUCTIONS (Cont.)



- Once the valve housings have been detached, open them by removing the four internal screws and removing the valve covers. Remove the old valves and clean the housings. Insert the tabs of the new valves and pull through. Be sure to maintain the original orientation of each valve. Reinstall the screws of each valve cover and set aside.
- Remove the hex nut and washer from one end of the armature and set aside. Remove the diaphragm retainer, first slip washer, diaphragm and second slip washer. If the white motor shaft cap is removed, simply push it back on making sure that the slots match those of the armature. Discard the old diaphragm and slip washers. Clean the armature assembly with a damp rag.



- Install one new slip washer onto the motor shaft cap. Install the diaphragm into the plastic diaphragm housing making sure the tabs are aligned with slots in housing. Push the retainer ring into the diaphragm to lock it in place. Install the outer slip washer followed by the convex metal washer and hex nut. The outermost slip washer must be held in place until the hex nut is tightened so it remains centered. Repeat steps 7 and 8 on the other side of the armature. Reattach the valve housings to the diaphragm housing and clip the spring clamp on the hoses back into place.



- Remove the 10 screws holding the base plate to the base of the air pump. This does not include the screw which holds the power wire clamp but does include the green ground wire screw. Lift the assembly around the side of the power cord. Remove and replace the exposed bottom gasket. Remove the filter element. Clean and dry the filter and replace in the base in the original orientation.
- With the gasket and filter in place, reattach the base plate to air pump base. Replace the top of the compressor housing on the bottom and mount the switch box using the four screws.
- Reinstall the air pump in the aeration chamber riser and restore power. Check for proper operation of the air pump and insure the diffuser assembly is creating a rolling motion of the chamber contents.

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***norweco***<sup>®</sup>

*Engineering the future of water  
and wastewater treatment*

**NORWECO, INC.  
NORWALK, OHIO  
U.S.A. 44857**

**www.norweco.com**

# ***norweco***® **HYDRO-KINETIC**®

## **WASTEWATER TREATMENT SYSTEM TROUBLESHOOTING**

During service inspections you may periodically encounter a situation which, if not identified and corrected, will result in interruption of service for the Hydro-Kinetic system. This troubleshooting guide is designed to enable you to isolate the cause of system problems that may be encountered from time to time. Whenever a potential problem is encountered, you should take immediate steps to identify and eliminate the cause. Please note that all areas of installation, including those normally the responsibility of the contractor, excavator, electrician and owner, are covered. You will find that many problems can be traced to causes other than the system or its components. Your help and suggestions in solving these for the owner will save unnecessary expense and will insure maximum system performance.

### **PLEASE NOTE:**

This troubleshooting guide provides efficient and correct solutions to most wastewater treatment problems when used in conjunction with established inspection procedures performed by a factory-trained service technician.

Before responding to a customer service call, check to see that:

- ✓ The service technician that will be assigned to answer the call has been factory-trained and certified by Norweco.
- ✓ Installation and service records for the particular system are up-to-date and have been reviewed.
- ✓ The service technician has a copy of the Hydro-Kinetic Product Manual.
- ✓ The service vehicle has exchange air pumps, recirculation pumps, air pump repair kits, and a fully stocked Tool Kaddy with replacement parts.
- ✓ Clear and concise directions to the installation, including tank and control center location, are given to the service technician.

## **OPERATIONAL TROUBLESHOOTING**

### **MUD OR SILT IN HYDRO-KINETIC SYSTEM OR HYDRO-KINETIC BIO-FILM REACTOR\***

Influent sewer line separated at a joint or fitting	Have contractor excavate and repair
Sewer line crushed	Have contractor excavate and replace
Defective seal around tank inlet or outlet	Excavate and reseal
Hydro-Kinetic tank structurally damaged	Excavate and patch or replace tank
Hydro-Kinetic casting joint improperly sealed	Excavate and seal with non-shrink grout

\*Have Hydro-Kinetic system pumped to remove mud after repairs have been completed. Multiple pumpings may be required to remove all mud from the Hydro-Kinetic system. See: Hydro-Kinetic Tank Pumping instructions.

# TROUBLESHOOTING (Cont.)

## SEPTIC ODOR IN HYDRO-KINETIC SYSTEM

No power to air pump	Place control center power switch in "on" position
Insufficient air delivery to aeration chamber	Service air pump
Incomplete treatment due to hydraulic overloading	See "Hydraulic Overloading of Hydro-Kinetic System"
Water softener backwash discharging into system	Have owner remove backwash line from system
Excessive solids in aeration chamber	Evaluate chamber and pump if necessary
Excessive solids in anoxic chamber	Evaluate chamber and pump if necessary
Circuit breaker tripped	See "Control Center Warning Light Glows/Audible Alarm Sounding"
Improperly sealed pretreatment chamber access cover	Seal pretreatment access cover
Vent cap openings restrict fresh air entry	Clean vent cap openings
Periodic septic odor for no reason	Have sanitary sewer vent checked

## HYDRAULIC OVERLOADING OF HYDRO-KINETIC SYSTEM

Ground water entering system through tank joint	Excavate and reseal joint with non-shrink grout or mastic
Ground water entering system through crack in tank	Excavate and repair crack with hydraulic cement
Ground water entering system through defective seal at inlet or outlet line	Excavate and reseal piping as needed
Roofing down spouts, footer drains, sump pump piping or garage and basement floor drains tied into Hydro-Kinetic system influent line	Have contractor relocate improper connection downstream of Hydro-Kinetic system
Check valve is stuck in closed position	Repair or replace check valve

## ORGANIC OVERLOADING OF HYDRO-KINETIC SYSTEM

Aeration chamber settled solids test reads in excess of 75%	Evaluate pretreatment chamber - See Hydro-Kinetic Tank Pumping instructions
Aeration chamber solids appear black	Evaluate pretreatment chamber - See Hydro-Kinetic Tank Pumping instructions

## FLOATING SOLIDS IN CLARIFICATION CHAMBER OR PLANT EFFLUENT

Excessive sludge on clarifier sidewalls	Scrape hopper side walls
Restriction of flow equalization device	Remove obstruction
Pretreatment chamber discharging excessive solids	Evaluate pretreatment chamber - See Hydro-Kinetic Tank Pumping instructions
Hydraulic overloading of system	See "Hydraulic Overloading of Hydro-Kinetic System"

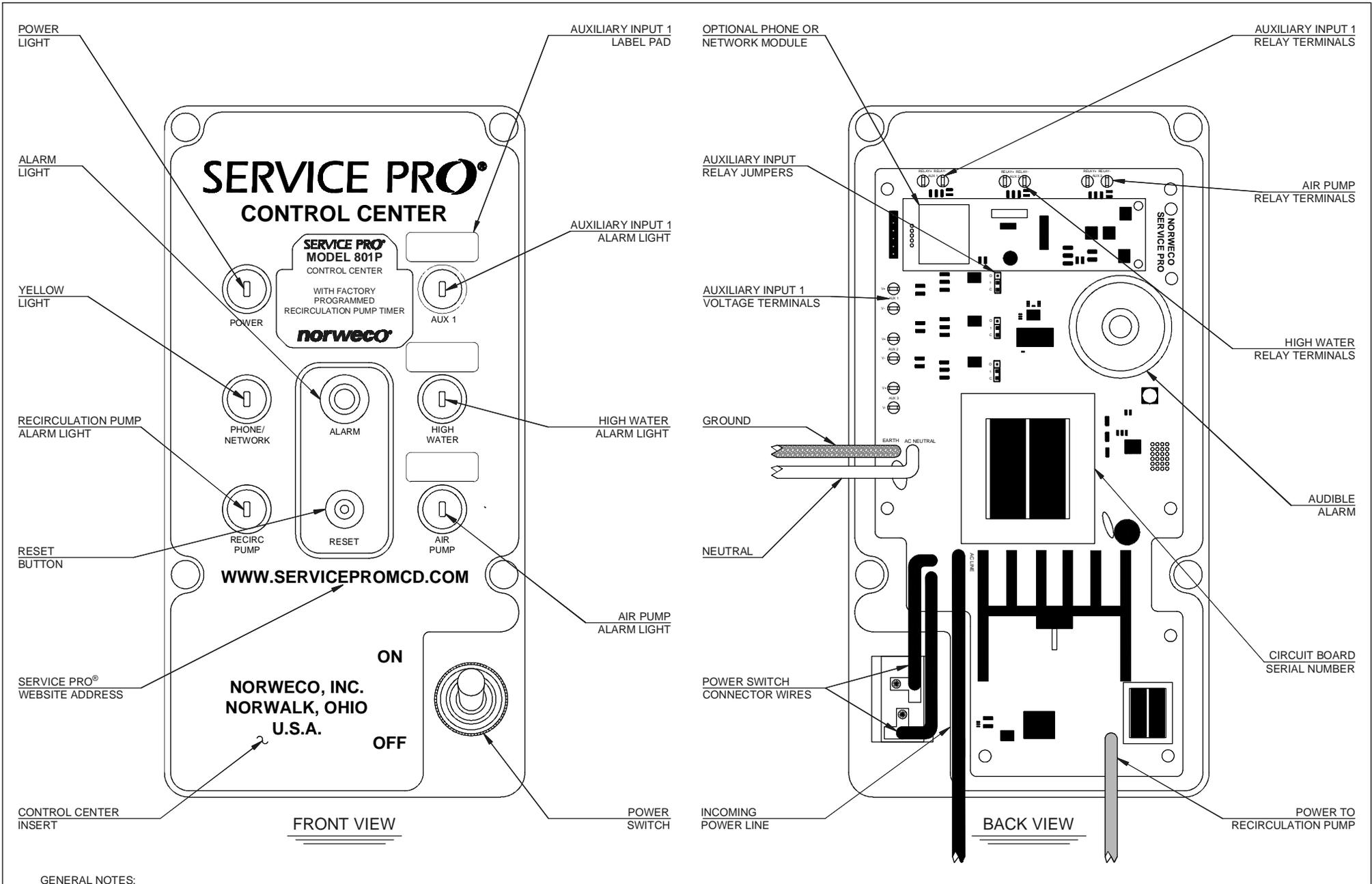
## CONTROL CENTER WARNING LIGHT GLOWS/AUDIBLE ALARM SOUNDING

Liquid in tank at level of high water alarm float	See "Hydraulic Overloading of Hydro-Kinetic System"
Air pump is not running	Check power supply to air pump
Dead short in power line to air pump	Have owner call his electrician

**PROGRESS THROUGH**

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www.norweco.com

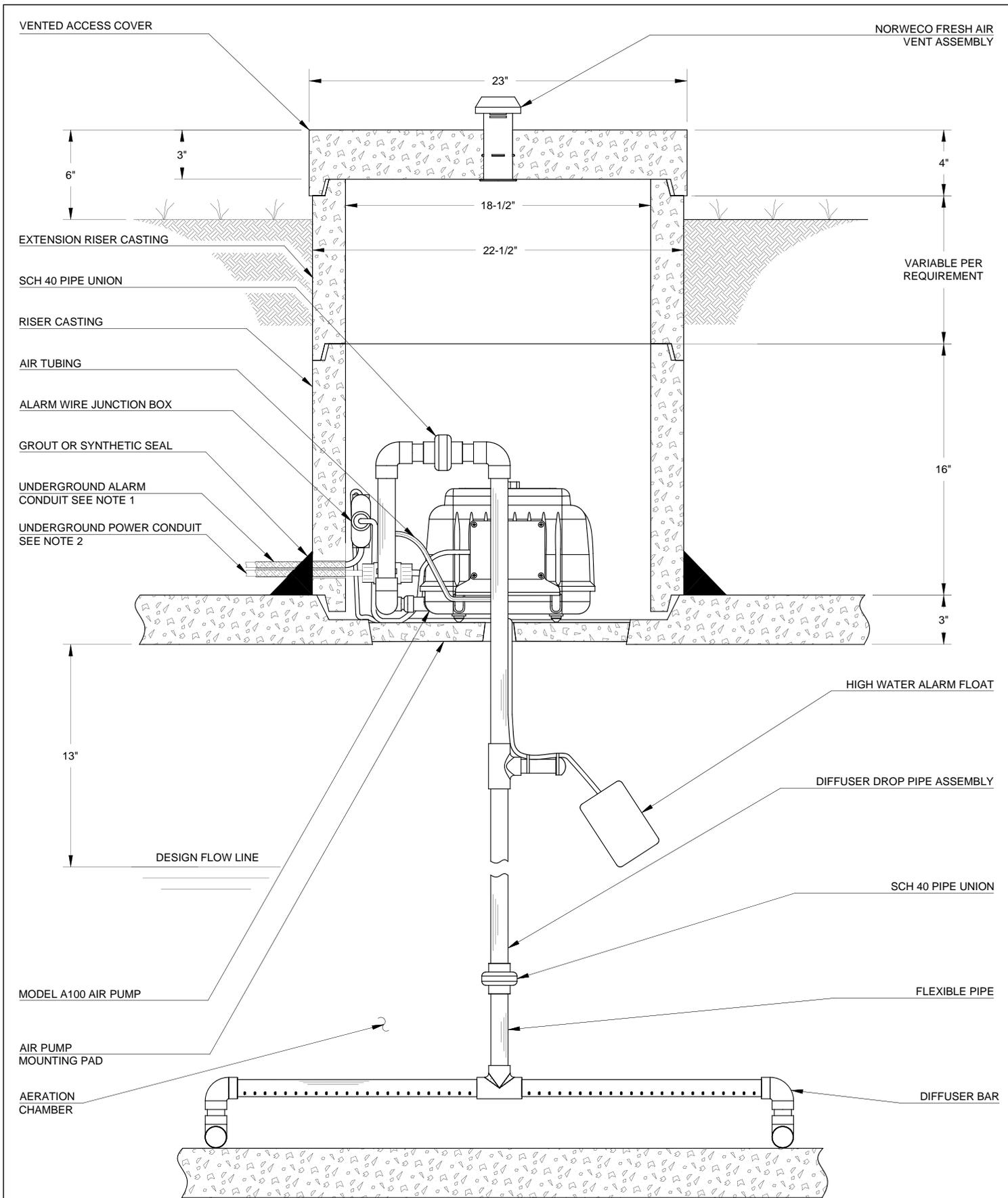
**SERVICE SINCE 1906**



**GENERAL NOTES:**

1. A DEDICATED 15 AMP CIRCUIT BREAKER AT MAIN SERVICE PANEL SHOULD NOT BE ENERGIZED UNTIL THE RECIRCULATION PUMP IS INSTALLED AND READY TO BE PLACED INTO OPERATION.
2. INSURE THE RECIRCULATION PUMP IS OPERATING WHEN THE FACILITY IS OCCUPIED.
3. THE LOCAL, LICENSED NORWECO DISTRIBUTOR WILL PLACE THE RECIRCULATION PUMP INTO SERVICE.
4. BLACK INSULATOR NOT SHOWN FOR CLARITY.

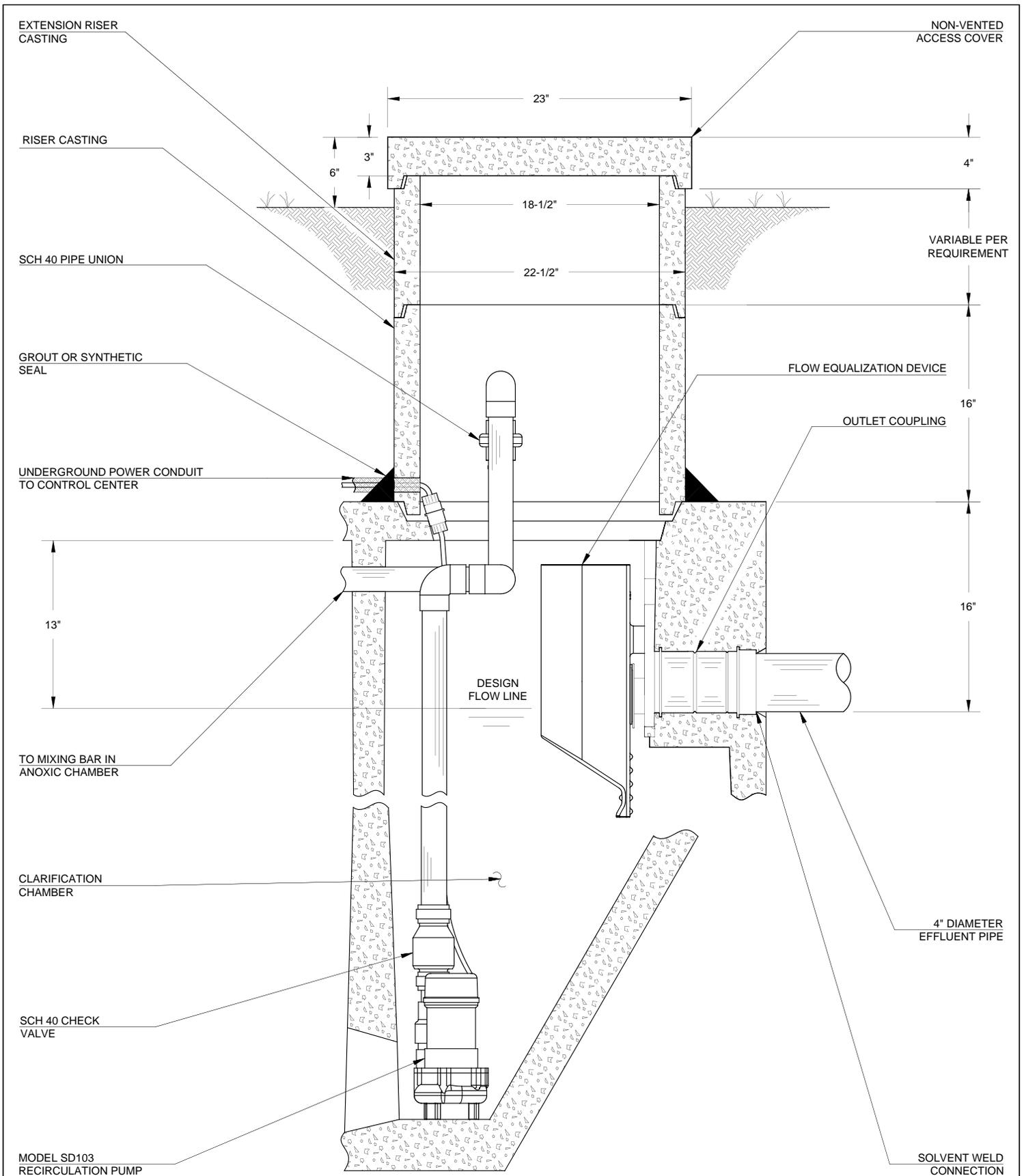
U.S. AND FOREIGN PATENTS PENDING	<b>norweco</b>	REVISIONS	9-9-13	REVISED BY	A
	SERVICE PRO® MODEL 801P CONTROL CENTER PICTORIAL	APPROVED BY	JMM	DATE	8-26-13
© MMXIII		SCALE	NTS	DRAWING NO.	PC-5-7716



**GENERAL NOTES:**

1. ROUTE ALARM WIRES FROM JUNCTION BOX IN A SEPARATE CONDUIT DIRECTLY TO AN APPROVED SERVICE PRO® CONTROL CENTER.
2. UNDERGROUND POWER SUPPLY MUST BE WIRED INTO AN APPROVED SERVICE PRO® CONTROL CENTER.
3. SERVICE PRO® CONTROL CENTER MUST BE WIRED INTO A SEPARATE 15 AMP CIRCUIT BREAKER AT MAIN ELECTRICAL SERVICE PANEL IN THE FACILITY.
4. AIR PUMP AND CONTROL CENTER MUST BE PROPERLY GROUNDED.
5. THE LOCAL, LICENSED NORWECO DISTRIBUTOR WILL PLACE THE AIR PUMP INTO SERVICE.

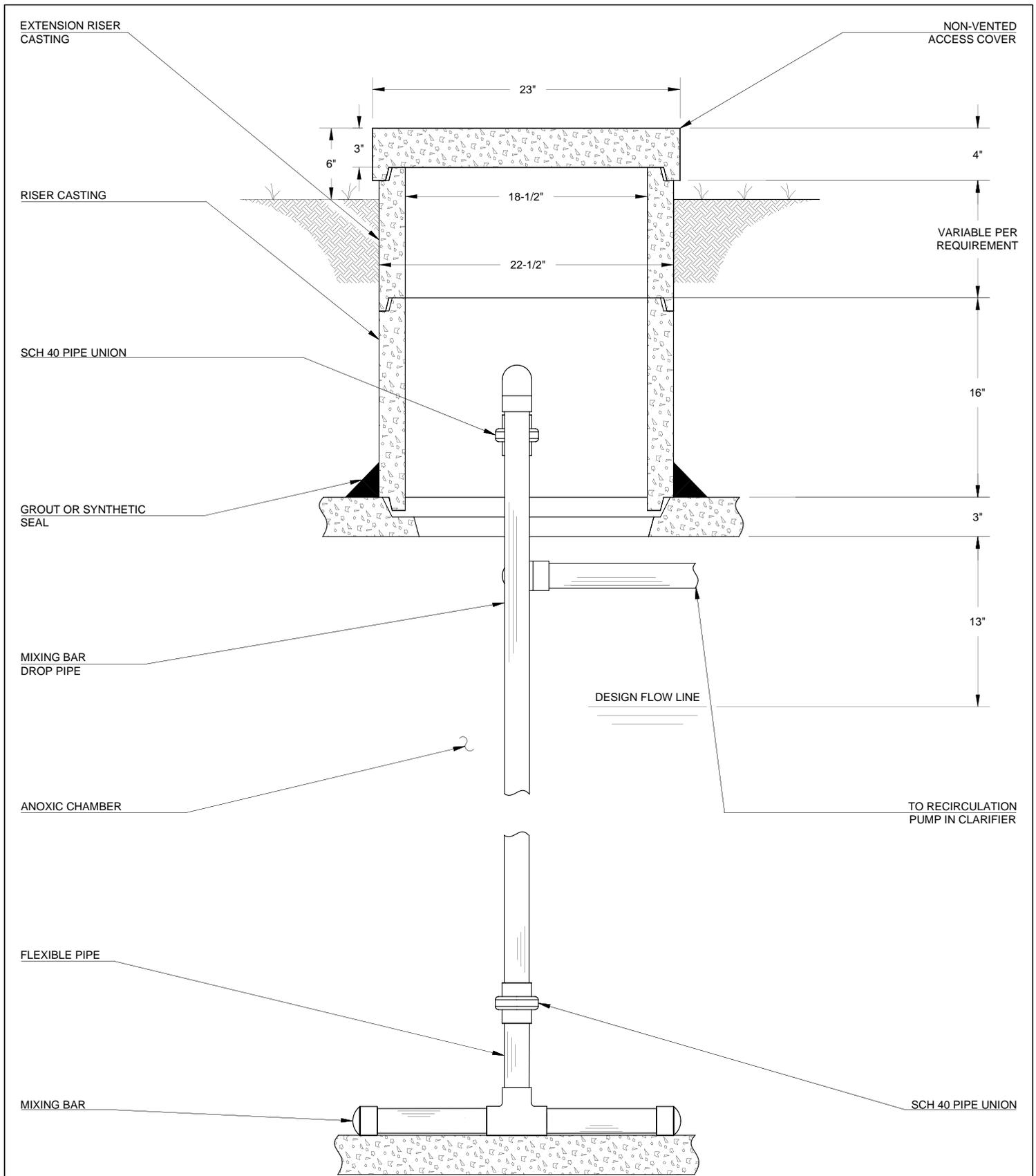
U.S. AND FOREIGN PATENTS PENDING  © MMXIII	<b><i>norweco</i></b>	REVISION DATE	REVISION
	HYDRO-KINETIC® MODEL A100 AIR PUMP AND PLUMBING INSTALLATION DETAIL	9-9-13	A
		APPROVED BY	SSS
		DATE	JMM 8-26-13
	SCALE	NTS	
	<small>THIS DRAWING IS THE PROPERTY OF NORWECO. IT IS TO BE USED ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED HEREON. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PERMISSION OF NORWECO.</small>	DRAWING NO.	PC-5-1022



**GENERAL NOTES:**

1. UNDERGROUND POWER SUPPLY MUST BE WIRED INTO AN APPROVED SERVICE PRO® CONTROL CENTER.
2. SERVICE PRO® CONTROL CENTER MUST BE WIRED INTO A SEPARATE 15 AMP CIRCUIT BREAKER AT MAIN ELECTRICAL SERVICE PANEL IN THE FACILITY.
3. RECIRCULATION PUMP AND CONTROL CENTER MUST BE GROUNDED.
4. THE LOCAL, LICENSED NORWECO DISTRIBUTOR WILL PLACE THE RECIRCULATION PUMP INTO SERVICE.

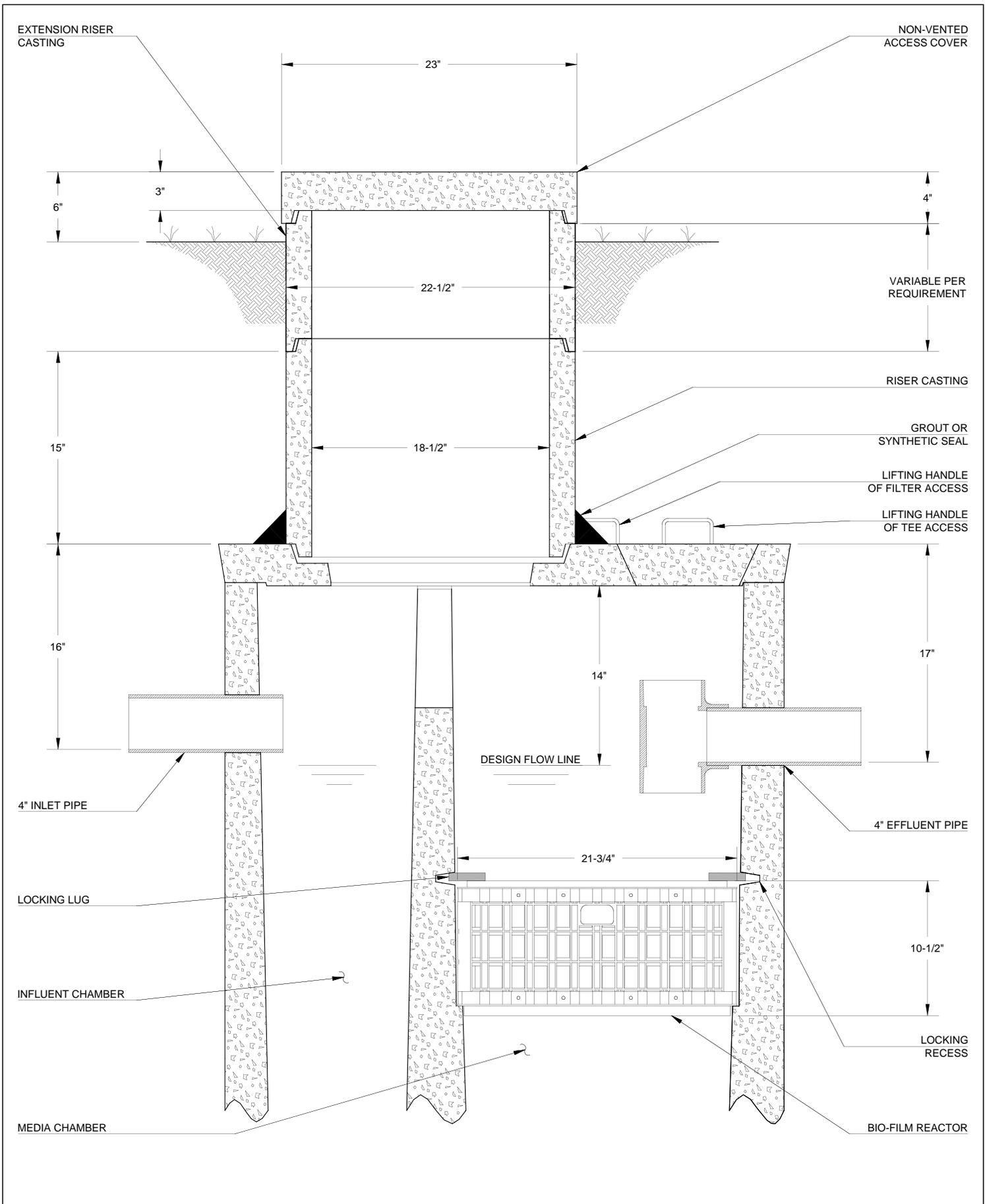
U.S. AND FOREIGN PATENTS PENDING  © MMXIII	<b>norweco</b>	REVISION DATE	9-9-13	REVISION	A
	HYDRO-KINETIC® RECIRCULATION PUMP AND PLUMBING	APPROVED BY	SSS		
		DATE	JMM		
		SCALE	8-26-13		
		DRAWING NO.	NTS		
			PC-5-1021		



**GENERAL NOTES:**

1. UNDERGROUND POWER SUPPLY MUST BE WIRED INTO AN APPROVED SERVICE PRO® CONTROL CENTER.
2. SERVICE PRO® CONTROL CENTER MUST BE WIRED INTO A SEPARATE 15 AMP CIRCUIT BREAKER AT MAIN ELECTRICAL SERVICE PANEL IN THE FACILITY.
3. RECIRCULATION PUMP AND CONTROL CENTER MUST BE GROUNDED.
4. THE LOCAL, LICENSED NORWECO DISTRIBUTOR WILL PLACE THE RECIRCULATION PUMP INTO SERVICE.

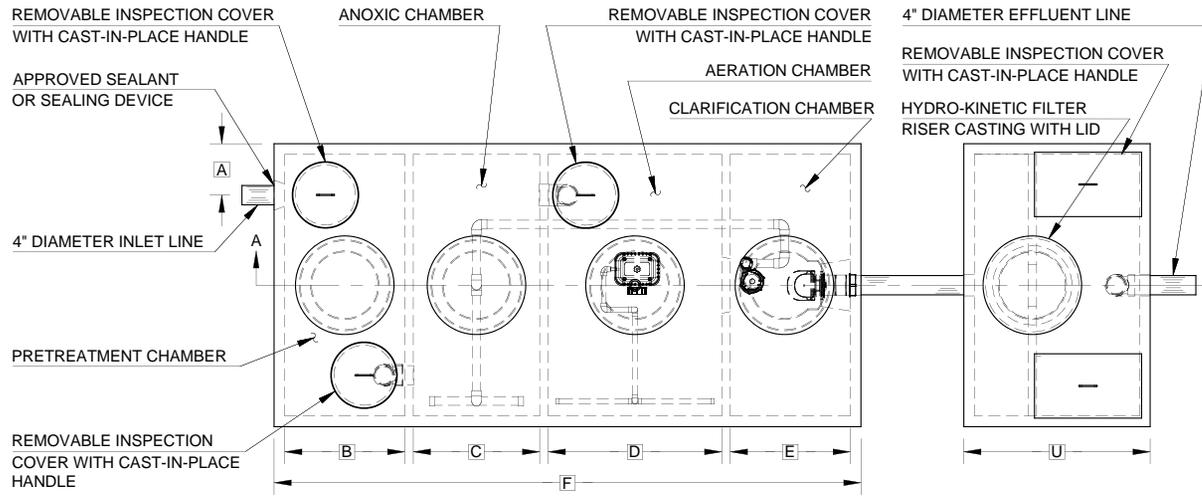
U.S. AND FOREIGN PATENTS PENDING  © MMXIII	<b>norweco</b>	REVISION DATE	REVISION
	HYDRO-KINETIC® MIXING BAR ASSEMBLY DETAIL	9-9-13	A
		DESIGNED BY	SSS
		APPROVED BY	JMM
DATE	8-26-13	SCALE	NTS
DRAWING NO.	THIS DRAWING IS THE PROPERTY OF NORWECO. ANY REPRODUCTION OR TRANSMISSION OF THIS DRAWING WITHOUT WRITTEN PERMISSION FROM NORWECO IS STRICTLY PROHIBITED.		PC-5-1023



**GENERAL NOTES:**

1. BIO-FILM REACTORS SHOULD BE INSERTED THROUGH THE RECTANGULAR OPENINGS ON THE TOP OF THE TANK.
2. CENTER BIO-FILM REACTORS SO THEY ARE TOUCHING AND EXTEND LOCKING LUGS INTO THE RECESSES IN THE TANK.
3. THE INLET PIPE SHOULD ONLY EXTEND THREE INCHES INTO THE HYDRO-KINETIC® FILTER.

U.S. AND FOREIGN PATENTS PENDING  © MMXIII	<b>norweco</b>		REVISION DATE 9-9-13	REVISION A
	HYDRO-KINETIC® BIO-FILM REACTOR INSTALLATION DETAIL		DRAWN BY SSS	APPROVED BY JMM
			DATE 8-26-13	SCALE NTS
			DRAWING NO. PC-5-1024	



NORWECO FRESH AIR VENT ASSEMBLY

PLAN VIEW

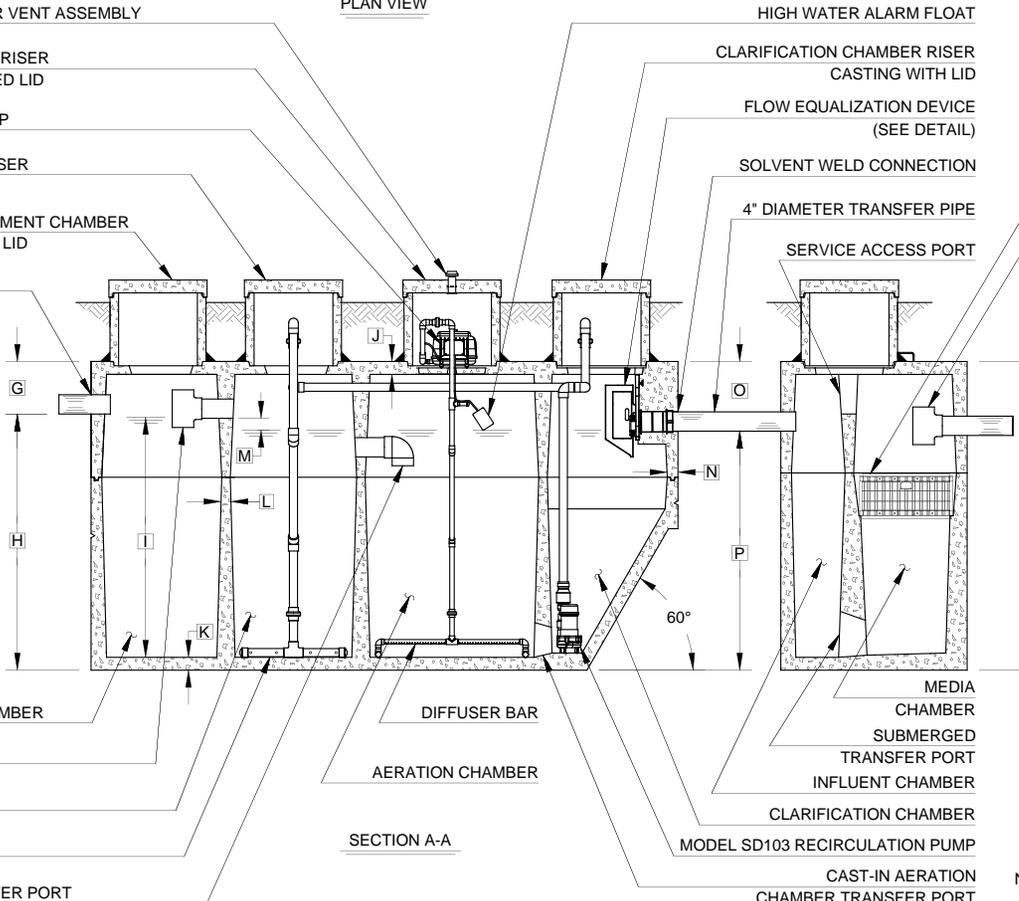
AERATION CHAMBER RISER CASTING WITH VENTED LID

MODEL A100 AIR PUMP

ANOXIC CHAMBER RISER CASTING WITH LID

OPTIONAL PRETREATMENT CHAMBER RISER CASTING WITH LID

APPROVED SEALANT OR SEALING DEVICE



SECTION A-A

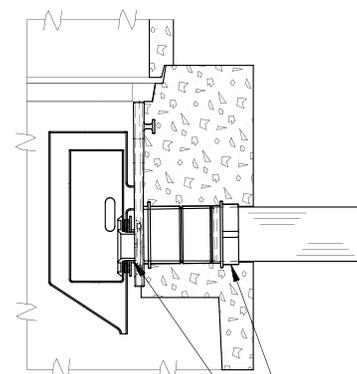
PRETREATMENT CHAMBER

TRANSFER TEE

ANOXIC CHAMBER

MIXING BAR

SUBMERGED TRANSFER PORT

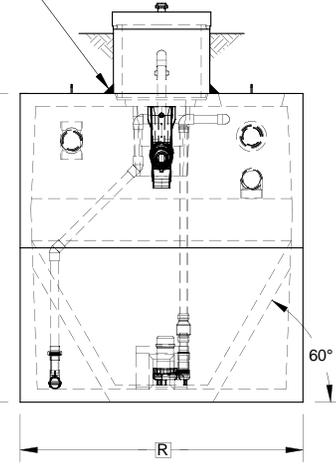


FLOW EQUALIZATION DEVICE DETAIL

FILTER MEDIA

OUTLET TEE

GROUT OR SYNTHETIC SEAL



OUTLET END VIEW

GENERAL NOTES:

- FALL THROUGH THE HYDRO-KINETIC® PLANT FROM INLET INVERT TO OUTLET INVERT IS FIVE INCHES. INLET INVERT IS TWELVE INCHES BELOW TANK TOP.
- ON DEEPER INSTALLATIONS, PRECAST RISERS MUST BE USED TO EXTEND CASTINGS TO GRADE. INSPECTION COVERS MUST BE DEVELOPED TO WITHIN TWELVE INCHES OF GRADE.
- TANK REINFORCED PER ACI STD. 318.
- REMOVABLE COVERS ON RISERS WEIGH IN EXCESS OF SEVENTY-FIVE POUNDS EACH TO PREVENT UNAUTHORIZED ACCESS.
- CONTACT THE LOCAL, LICENSED HYDRO-KINETIC® DISTRIBUTOR FOR ELECTRICAL REQUIREMENTS.

PROJECT ENGINEER'S APPROVAL:  
I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

DATE: \_\_\_\_\_

NAME: \_\_\_\_\_

CONTRACTOR'S CERTIFICATION:  
I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

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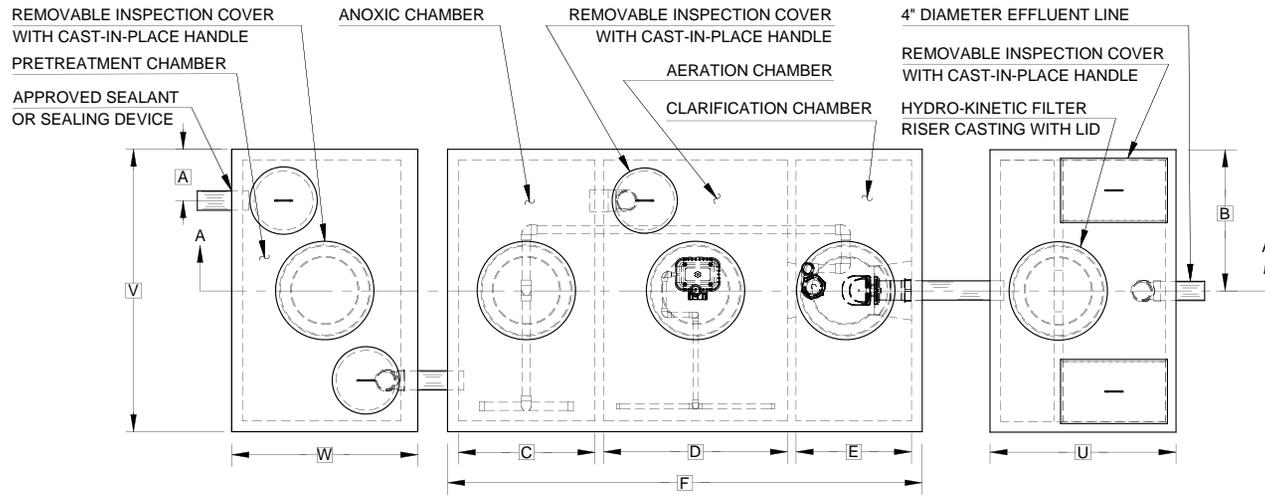
NAME: \_\_\_\_\_

CRITICAL DIMENSIONS

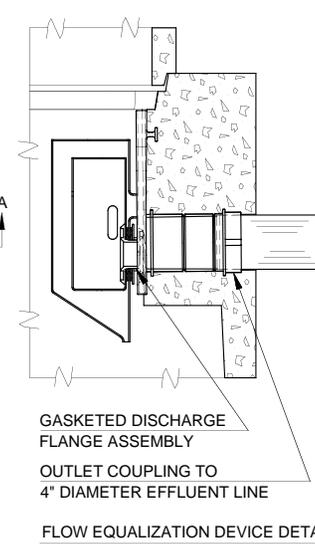
A	1'- 0"	N	0'- 2 1/2"
B	2'- 4"	O	1'- 4"
C	2'- 5 1/2"	P	4'- 8"
D	3'- 4 1/2"	Q	6'- 0"
E	2'- 4"	R	5'- 6"
F	11'- 5"	S	1'- 5"
G	1'- 0"	T	4'- 7"
H	5'- 0"	U	3'- 7 1/2"
I	4'- 8"	V	
J	0'- 3"	W	
K	0'- 3"	X	
L	0'- 2"	Y	
M	0'- 3"	Z	

U.S. AND FOREIGN PATENTS PENDING	<b>norweco</b>	DESIGNED BY	09-18-13	REVISION	F
	HYDRO-KINETIC® MODEL 600 FEU WASTEWATER TREATMENT SYSTEM	DRAWN BY	JMM	APPROVED BY	VPE
		DATE	10-16-12	SCALE	NTS
© MMXIII		DRAWING NO.			PC-5-1001

NOTE: TOTAL SYSTEM CAPACITY: 1,820 GALLONS  
RATED CAPACITY: 500/600 GALLONS PER DAY

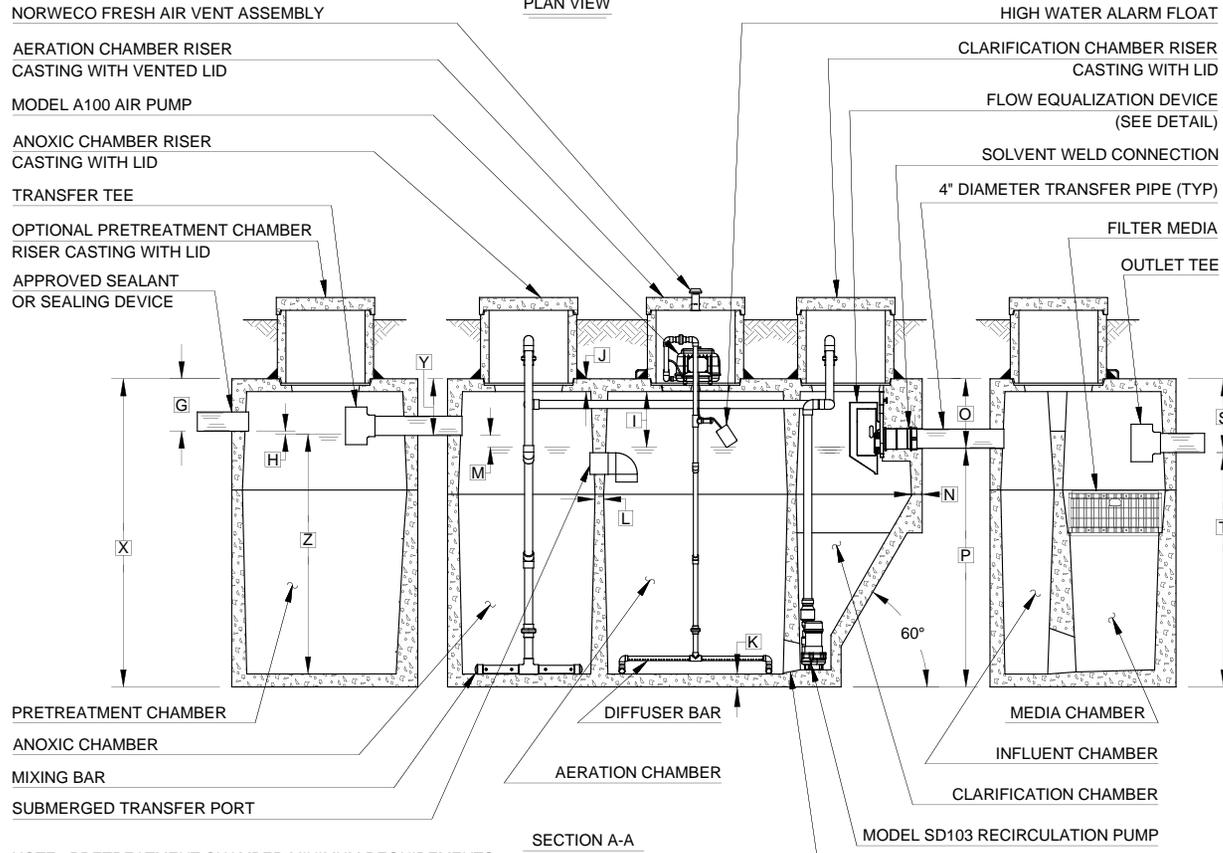


PLAN VIEW

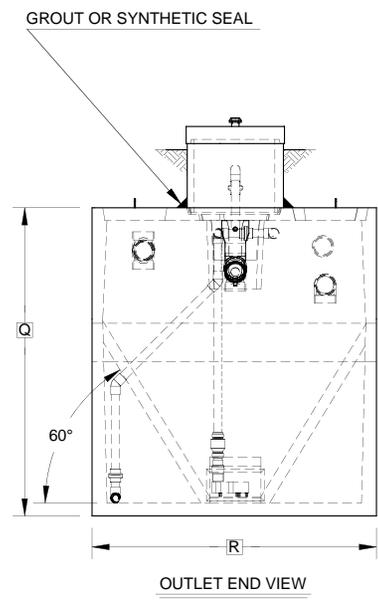


GASKETED DISCHARGE FLANGE ASSEMBLY  
OUTLET COUPLING TO 4" DIAMETER EFFLUENT LINE  
FLOW EQUALIZATION DEVICE DETAIL

- GENERAL NOTES:**
- FALL THROUGH THE HYDRO-KINETIC® PLANT FROM INLET INVERT TO OUTLET INVERT IS FIVE INCHES. INLET INVERT IS TWELVE INCHES BELOW TANK TOP.
  - ON DEEPER INSTALLATIONS, PRECAST RISERS MUST BE USED TO EXTEND CASTINGS TO GRADE. INSPECTION COVERS MUST BE DEVELOPED TO WITHIN TWELVE INCHES OF GRADE.
  - TANK REINFORCED PER ACI STD. 318.
  - REMOVABLE COVERS ON RISERS WEIGH IN EXCESS OF SEVENTY-FIVE POUNDS EACH TO PREVENT UNAUTHORIZED ACCESS.
  - CONTACT THE LOCAL, LICENSED HYDRO-KINETIC® DISTRIBUTOR FOR ELECTRICAL REQUIREMENTS.



SECTION A-A



OUTLET END VIEW

NOTE: PRETREATMENT CHAMBER MINIMUM REQUIREMENTS SHALL BE: 400 GALLONS CAPACITY, 7 GALLONS PER INCH OF LIQUID LEVEL AND 9 INCHES OF FREEBOARD.

NOTE: TOTAL SYSTEM CAPACITY: 1,820 GALLONS  
RATED CAPACITY: 500/600 GALLONS PER DAY

PROJECT ENGINEER'S APPROVAL:  
I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

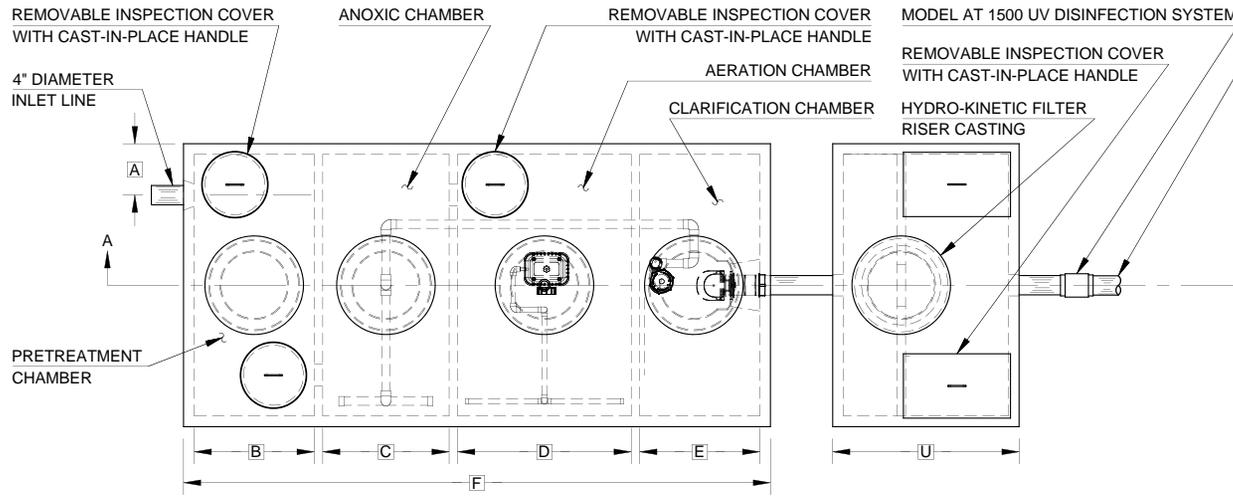
DATE: \_\_\_\_\_  
NAME: \_\_\_\_\_

CONTRACTOR'S CERTIFICATION:  
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DATE: \_\_\_\_\_  
NAME: \_\_\_\_\_

CRITICAL DIMENSIONS			
A	1'-0"	N	0'-2 1/2"
B	2'-9"	O	1'-4"
C	2'-8"	P	4'-8"
D	3'-7"	Q	6'-0"
E	2'-3"	R	5'-6"
F	9'-3"	S	1'-5"
G	1'-0"	T	4'-7"
H	0'-1"	U	3'-7 1/2"
I	1'-1"	V	
J	0'-3"	W	
K	0'-3"	X	
L	0'-2"	Y	1'-1"
M	0'-3"	Z	

U.S. AND FOREIGN PATENTS PENDING	<b>norweco</b>	REVISED	9-18-13	REVISION	C
		DESIGNED BY	SSS	APPROVED BY	JMM
	MODEL 600 FEU HYDRO-KINETIC® WASTEWATER TREATMENT SYSTEM WITH EXTERNAL PRETREATMENT CHAMBER	DATE	2-12-13	SCALE	NTS
© MMII		DRAWING NO.			PC-5-1006



NORWECO FRESH AIR VENT ASSEMBLY

PLAN VIEW

HIGH WATER ALARM FLOAT

AERATION CHAMBER RISER CASTING WITH VENTED LID

CLARIFICATION CHAMBER RISER CASTING WITH LID

MODEL A100 AIR PUMP

FLOW EQUALIZATION DEVICE

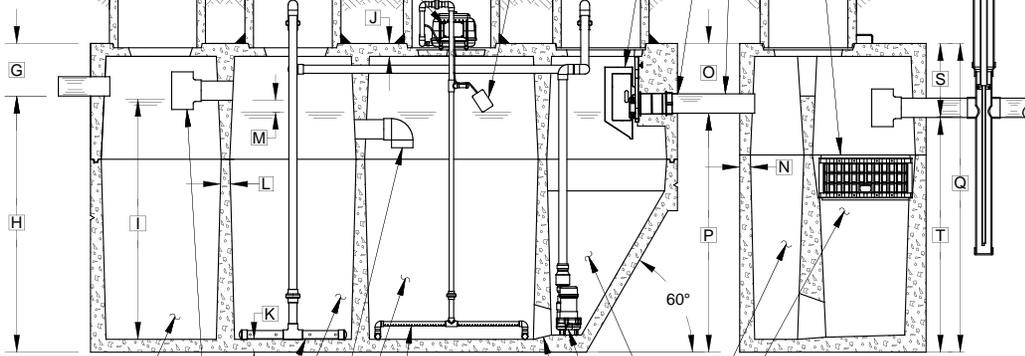
ANOXIC CHAMBER RISER CASTING WITH LID

SOLVENT WELD CONNECTION

OPTIONAL PRETREATMENT CHAMBER RISER CASTING WITH LID

4" DIAMETER TRANSFER PIPE

FILTER MEDIA



PRETREATMENT CHAMBER

DIFFUSER BAR

HYDRO-KINETIC FILTER

TRANSFER TEE

AERATION CHAMBER

INFLUENT CHAMBER

MIXING BAR

CLARIFICATION CHAMBER

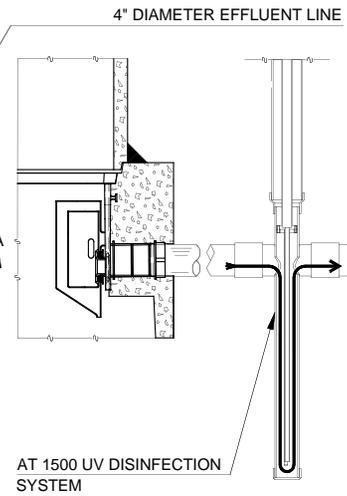
ANOXIC CHAMBER

MODEL SD103 RECIRCULATION PUMP

SUBMERGED TRANSFER PORT

CAST-IN AERATION CHAMBER TRANSFER PORT

SECTION A-A

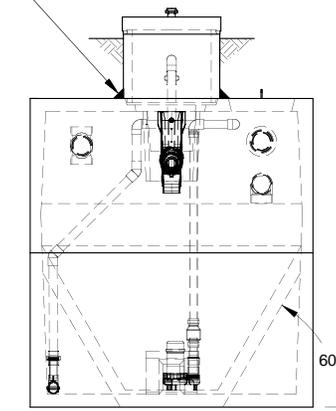


AT 1500 UV DISINFECTION SYSTEM

SYSTEM DISCHARGE DETAIL

MODEL AT 1500 UV DISINFECTION SYSTEM

GROUT OR SYNTHETIC SEAL



OUTLET END VIEW

TWO TANK TREATMENT TRAIN  
1 AND 2 FOOT SOIL DEPTH CREDIT

NOTE: TOTAL SYSTEM CAPACITY: 1,820 GALLONS  
RATED CAPACITY: 500/600 GALLONS PER DAY

GENERAL NOTES:

- ① FALL THROUGH THE HYDRO-KINETIC® PLANT FROM INLET INVERT TO OUTLET INVERT IS FIVE INCHES. INLET INVERT IS TWELVE INCHES BELOW TANK TOP.
- ② PRECAST CONCRETE OR PLASTIC RISERS MUST BE USED FOR ALL SERVICE ACCESS OPENINGS. THE RISERS MUST EXTEND TO AT LEAST 3" ABOVE FINISHED GRADE.
- ③ CONCRETE COVERS ON RISERS WEIGH IN EXCESS OF SEVENTY-FIVE POUNDS EACH TO PREVENT UNAUTHORIZED ACCESS. PLASTIC COVERS ON RISERS MUST BE SECURED WITH SPECIALTY FASTENERS.
- ④ CONTACT THE LOCAL, LICENSED HYDRO-KINETIC® DISTRIBUTOR FOR ELECTRICAL REQUIREMENTS.
- ⑤ MAXIMUM DISTANCE BETWEEN HYDRO-KINETIC® TANK AND UV IS THREE FEET.

PROJECT ENGINEER'S APPROVAL:  
I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

DATE: \_\_\_\_\_

NAME: \_\_\_\_\_

CONTRACTOR'S CERTIFICATION:  
I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

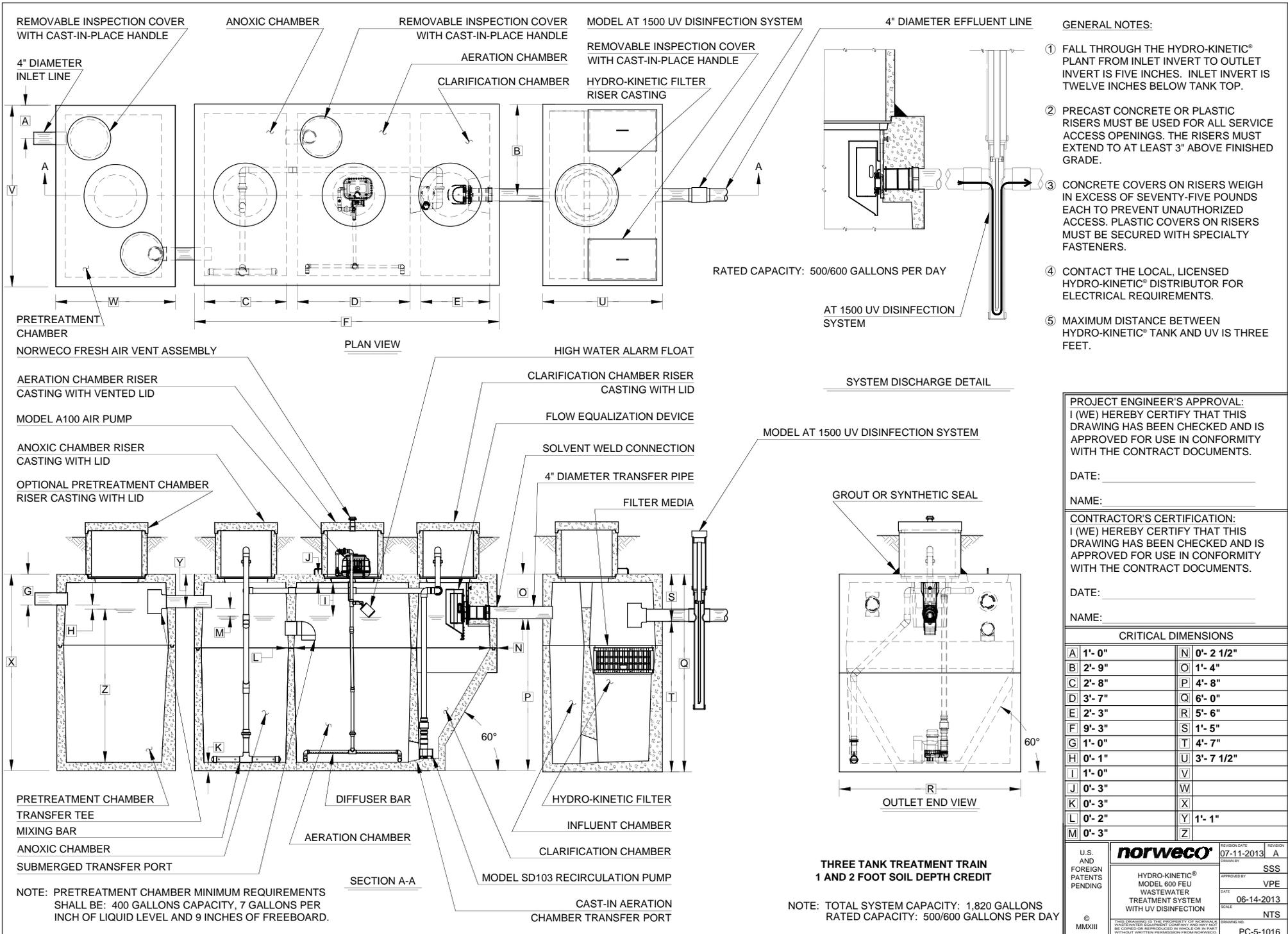
DATE: \_\_\_\_\_

NAME: \_\_\_\_\_

CRITICAL DIMENSIONS

A	1'-0"	N	0'-2 1/2"
B	2'-4"	O	1'-4"
C	2'-5 1/2"	P	4'-8"
D	3'-4 1/2"	Q	6'-0"
E	2'-4"	R	5'-6"
F	11'-5"	S	1'-5"
G	1'-0"	T	4'-7"
H	5'-0"	U	3'-7 1/2"
I	4'-8"	V	
J	0'-3"	W	
K	0'-3"	X	
L	0'-2"	Y	
M	0'-3"	Z	

U.S. AND FOREIGN PATENTS PENDING		APPROVED DATE	07-11-2013	DESIGN	A
		DESIGNED BY	JMM	APPROVED BY	VPE
	HYDRO-KINETIC® MODEL 600 FEU WASTEWATER TREATMENT SYSTEM WITH UV DISINFECTION	DATE	05-29-2013	SCALE	NTS
© MMXIII		DRAWING NO.			PC-5-1015



- GENERAL NOTES:**
- FALL THROUGH THE HYDRO-KINETIC® PLANT FROM INLET INVERT TO OUTLET INVERT IS FIVE INCHES. INLET INVERT IS TWELVE INCHES BELOW TANK TOP.
  - PRECAST CONCRETE OR PLASTIC RISERS MUST BE USED FOR ALL SERVICE ACCESS OPENINGS. THE RISERS MUST EXTEND TO AT LEAST 3" ABOVE FINISHED GRADE.
  - CONCRETE COVERS ON RISERS WEIGH IN EXCESS OF SEVENTY-FIVE POUNDS EACH TO PREVENT UNAUTHORIZED ACCESS. PLASTIC COVERS ON RISERS MUST BE SECURED WITH SPECIALTY FASTENERS.
  - CONTACT THE LOCAL, LICENSED HYDRO-KINETIC® DISTRIBUTOR FOR ELECTRICAL REQUIREMENTS.
  - MAXIMUM DISTANCE BETWEEN HYDRO-KINETIC® TANK AND UV IS THREE FEET.

**PROJECT ENGINEER'S APPROVAL:**  
 I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

DATE: \_\_\_\_\_

NAME: \_\_\_\_\_

**CONTRACTOR'S CERTIFICATION:**  
 I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

DATE: \_\_\_\_\_

NAME: \_\_\_\_\_

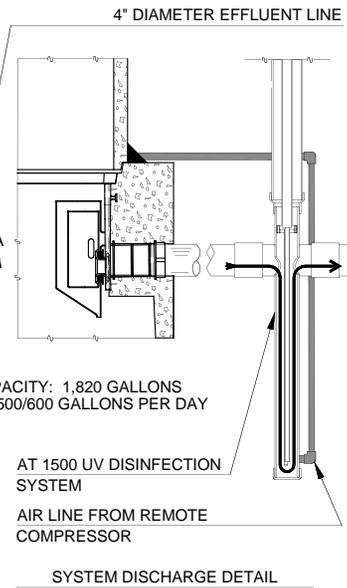
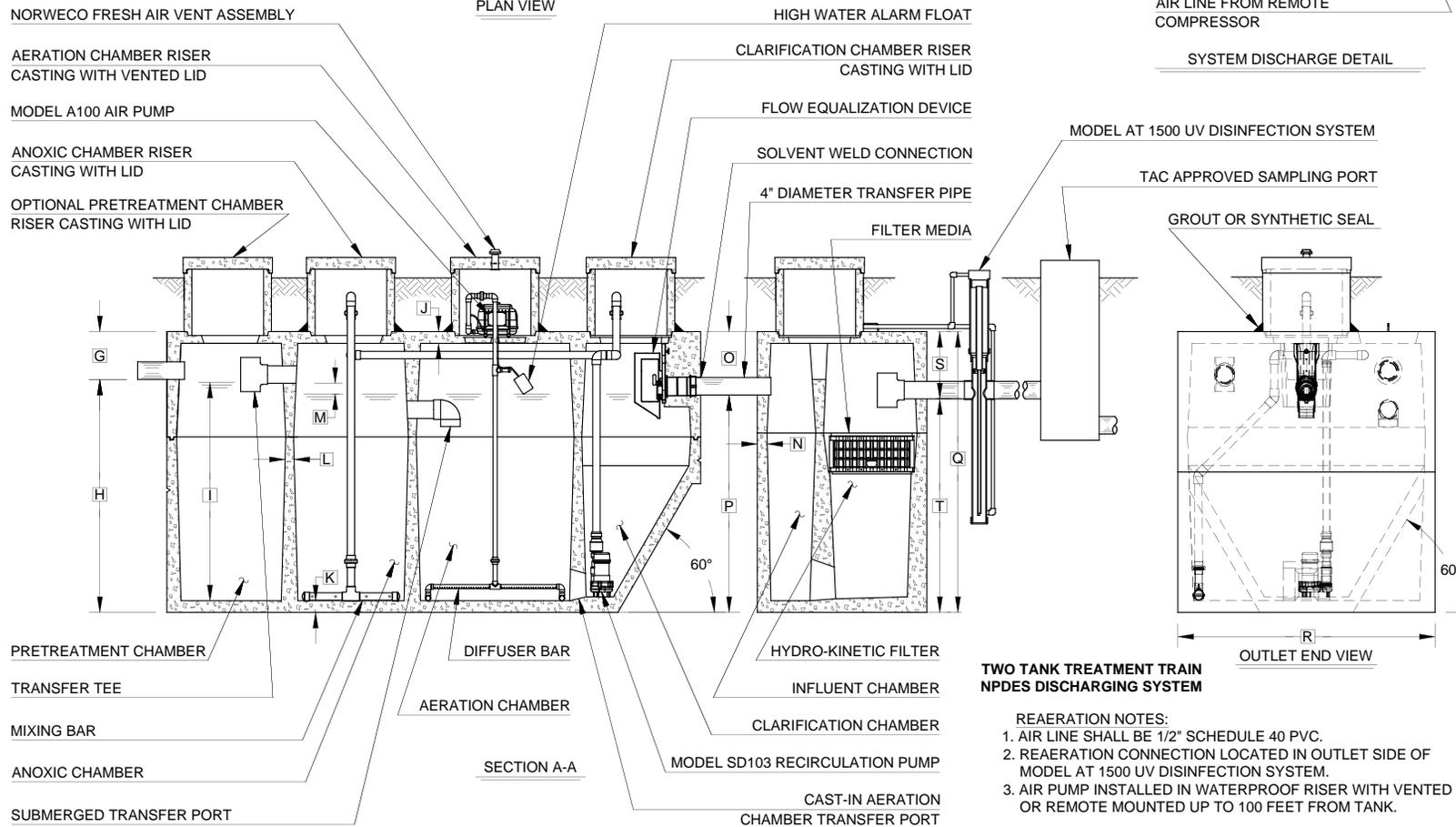
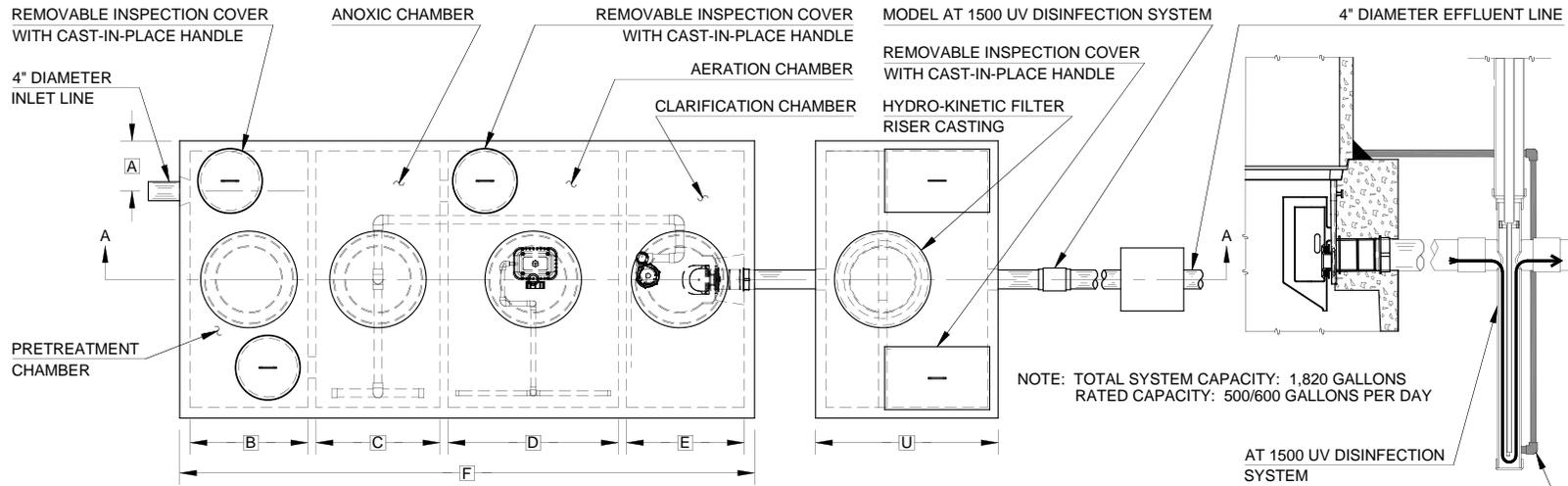
**CRITICAL DIMENSIONS**

A	1'-0"	N	0'-2 1/2"
B	2'-9"	O	1'-4"
C	2'-8"	P	4'-8"
D	3'-7"	Q	6'-0"
E	2'-3"	R	5'-6"
F	9'-3"	S	1'-5"
G	1'-0"	T	4'-7"
H	0'-1"	U	3'-7 1/2"
I	1'-0"	V	
J	0'-3"	W	
K	0'-3"	X	
L	0'-2"	Y	1'-1"
M	0'-3"	Z	

U.S. AND FOREIGN PATENTS PENDING		07-11-2013	A
		SSS	
	HYDRO-KINETIC® MODEL 600 FEU WASTEWATER TREATMENT SYSTEM WITH UV DISINFECTION	APPROVED BY	VPE
		DATE	06-14-2013
		SCALE	NTS
© MMXIII		DRAWING NO.	PC-5-1016

**THREE TANK TREATMENT TRAIN 1 AND 2 FOOT SOIL DEPTH CREDIT**

NOTE: TOTAL SYSTEM CAPACITY: 1,820 GALLONS  
 RATED CAPACITY: 500/600 GALLONS PER DAY



- GENERAL NOTES:**
- FALL THROUGH THE HYDRO-KINETIC® PLANT FROM INLET INVERT TO OUTLET INVERT IS FIVE INCHES. INLET INVERT IS TWELVE INCHES BELOW TANK TOP.
  - PRECAST CONCRETE OR PLASTIC RISERS MUST BE USED FOR ALL SERVICE ACCESS OPENINGS. THE RISERS MUST EXTEND TO AT LEAST 3" ABOVE FINISHED GRADE.
  - AIR PUMP AND SERVICE PRO® CONTROL CENTER MAY BE REMOTE MOUNTED UP TO 100 FEET FROM TANK.
  - CONTACT THE LOCAL, LICENSED HYDRO-KINETIC® DISTRIBUTOR FOR ELECTRICAL REQUIREMENTS.
  - SERVICE PRO® CONTROL CENTER SHALL MONITOR UV AND RE-AERATION AND SHALL PROVIDE TELEMETRY OR PUMP LOCKOUT.
  - MAXIMUM DISTANCE BETWEEN HYDRO-KINETIC® TANK AND UV IS THREE FEET. MAXIMUM DISTANCE BETWEEN UV AND SAMPLING PORT IS THREE FEET.

**PROJECT ENGINEER'S APPROVAL:**  
 I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

DATE: \_\_\_\_\_  
 NAME: \_\_\_\_\_

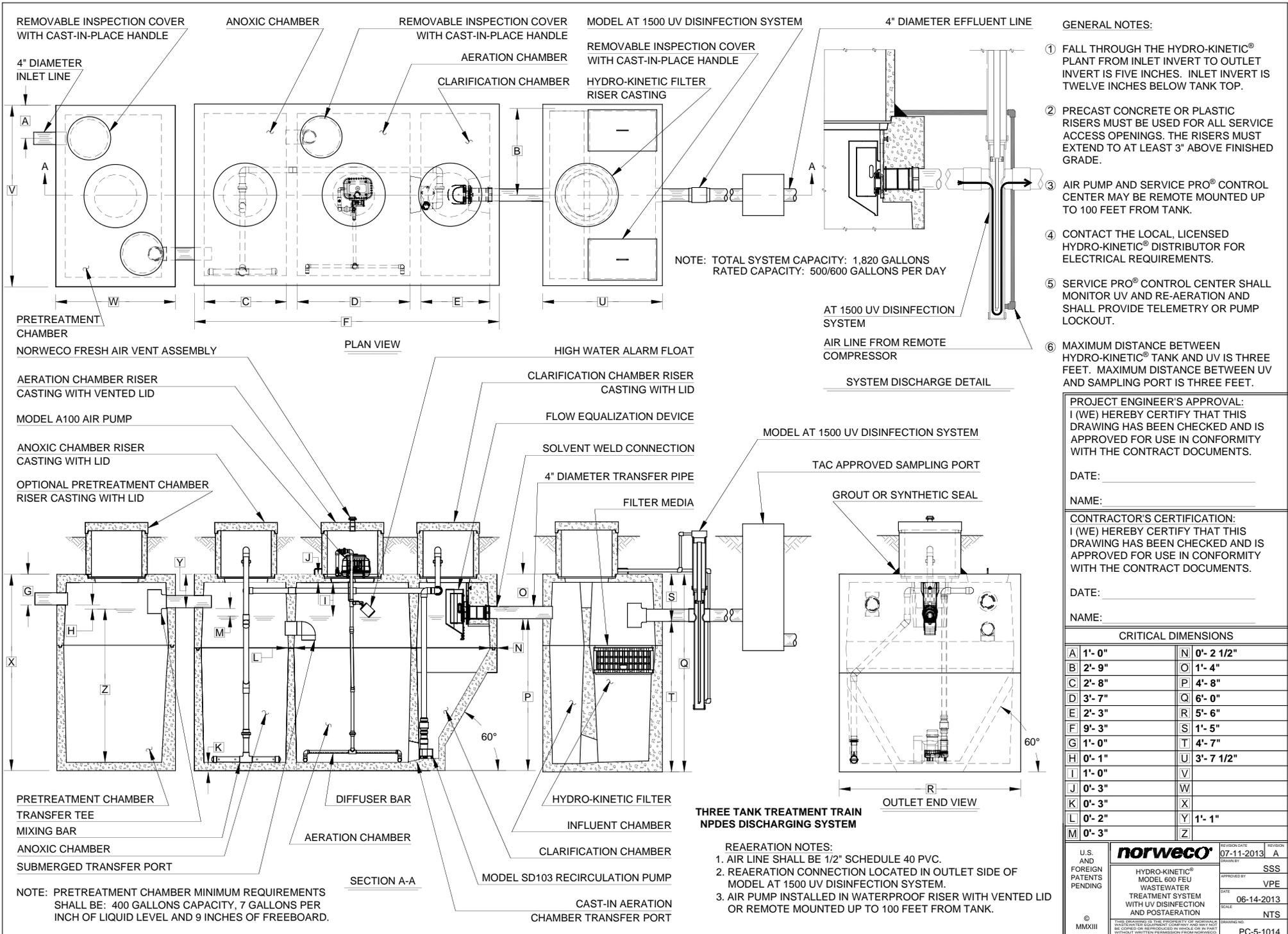
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DATE: \_\_\_\_\_  
 NAME: \_\_\_\_\_

CRITICAL DIMENSIONS			
A	1'-0"	N	0'-2 1/2"
B	2'-4"	O	1'-4"
C	2'-5 1/2"	P	4'-8"
D	3'-4 1/2"	Q	6'-0"
E	2'-4"	R	5'-6"
F	11'-5"	S	1'-5"
G	1'-0"	T	4'-7"
H	5'-0"	U	3'-7 1/2"
I	4'-8"	V	
J	0'-3"	W	
K	0'-3"	X	
L	0'-2"	Y	
M	0'-3"	Z	

- TWO TANK TREATMENT TRAIN NPDES DISCHARGING SYSTEM**
- REAERATION NOTES:**
- AIR LINE SHALL BE 1/2" SCHEDULE 40 PVC.
  - REAERATION CONNECTION LOCATED IN OUTLET SIDE OF MODEL AT 1500 UV DISINFECTION SYSTEM.
  - AIR PUMP INSTALLED IN WATERPROOF RISER WITH VENTED LID OR REMOTE MOUNTED UP TO 100 FEET FROM TANK.

U.S. AND FOREIGN PATENTS PENDING		APPROVED DATE: 07-11-2013	REVISION: A
		APPROVED BY: JMM	DATE: 05-29-2013
© MMXIII	HYDRO-KINETIC® MODEL 600 FEU WASTEWATER TREATMENT SYSTEM WITH UV DISINFECTION AND POSTAERATION	SCALE: NTS	DRAWING NO: PC-5-1012



- GENERAL NOTES:**
- FALL THROUGH THE HYDRO-KINETIC® PLANT FROM INLET INVERT TO OUTLET INVERT IS FIVE INCHES. INLET INVERT IS TWELVE INCHES BELOW TANK TOP.
  - PRECAST CONCRETE OR PLASTIC RISERS MUST BE USED FOR ALL SERVICE ACCESS OPENINGS. THE RISERS MUST EXTEND TO AT LEAST 3" ABOVE FINISHED GRADE.
  - AIR PUMP AND SERVICE PRO® CONTROL CENTER MAY BE REMOTE MOUNTED UP TO 100 FEET FROM TANK.
  - CONTACT THE LOCAL, LICENSED HYDRO-KINETIC® DISTRIBUTOR FOR ELECTRICAL REQUIREMENTS.
  - SERVICE PRO® CONTROL CENTER SHALL MONITOR UV AND RE-AERATION AND SHALL PROVIDE TELEMETRY OR PUMP LOCKOUT.
  - MAXIMUM DISTANCE BETWEEN HYDRO-KINETIC® TANK AND UV IS THREE FEET. MAXIMUM DISTANCE BETWEEN UV AND SAMPLING PORT IS THREE FEET.

**PROJECT ENGINEER'S APPROVAL:**  
 I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

DATE: \_\_\_\_\_  
 NAME: \_\_\_\_\_

**CONTRACTOR'S CERTIFICATION:**  
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DATE: \_\_\_\_\_  
 NAME: \_\_\_\_\_

CRITICAL DIMENSIONS			
A	1'-0"	N	0'-2 1/2"
B	2'-9"	O	1'-4"
C	2'-8"	P	4'-8"
D	3'-7"	Q	6'-0"
E	2'-3"	R	5'-6"
F	9'-3"	S	1'-5"
G	1'-0"	T	4'-7"
H	0'-1"	U	3'-7 1/2"
I	1'-0"	V	
J	0'-3"	W	
K	0'-3"	X	
L	0'-2"	Y	1'-1"
M	0'-3"	Z	

U.S. AND FOREIGN PATENTS PENDING		07-11-2013	DESIGN
		SSS	REVISION
	HYDRO-KINETIC® MODEL 600 FEU WASTEWATER TREATMENT SYSTEM WITH UV DISINFECTION AND POSTAERATION	APPROVED BY	VPE
		DATE	06-14-2013
		SCALE	NTS
<small>THIS DRAWING IS THE PROPERTY OF NORWECO. IT IS TO BE USED ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED HEREON. IT IS NOT TO BE REPRODUCED, COPIED, OR IN ANY MANNER USED FOR ANY OTHER PROJECT WITHOUT WRITTEN PERMISSION FROM NORWECO.</small>		DRAWING NO.	PC-5-1014

- REAERATION NOTES:**
- AIR LINE SHALL BE 1/2" SCHEDULE 40 PVC.
  - REAERATION CONNECTION LOCATED IN OUTLET SIDE OF MODEL AT 1500 UV DISINFECTION SYSTEM.
  - AIR PUMP INSTALLED IN WATERPROOF RISER WITH VENTED LID OR REMOTE MOUNTED UP TO 100 FEET FROM TANK.

REMOVABLE INSPECTION COVER WITH CAST-IN-PLACE HANDLE  
 PRETREATMENT CHAMBER  
 APPROVED SEALANT OR SEALING DEVICE

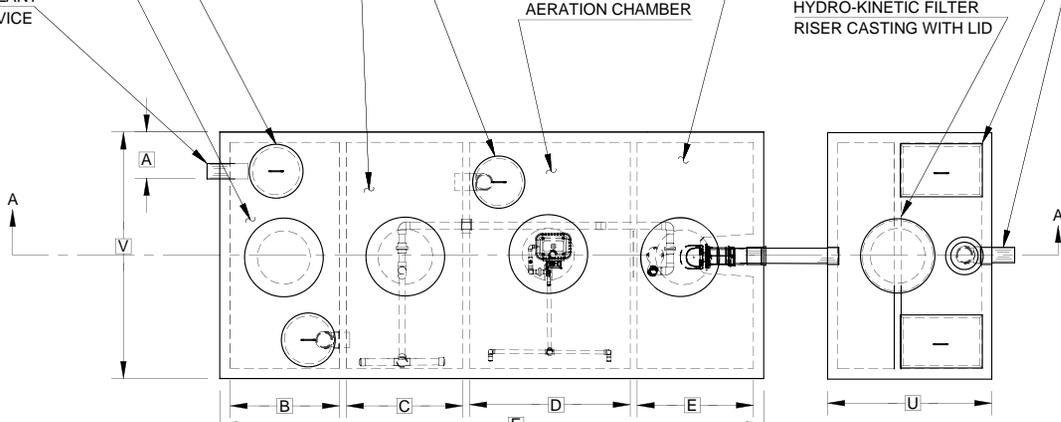
ANOXIC CHAMBER

REMOVABLE INSPECTION COVER WITH CAST-IN-PLACE HANDLE  
 CLARIFICATION CHAMBER

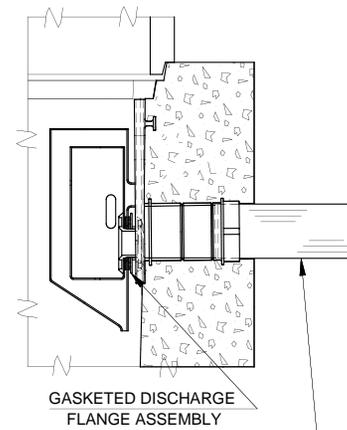
AERATION CHAMBER

4" DIAMETER EFFLUENT LINE

REMOVABLE INSPECTION COVER WITH CAST-IN-PLACE HANDLE  
 HYDRO-KINETIC FILTER RISER CASTING WITH LID



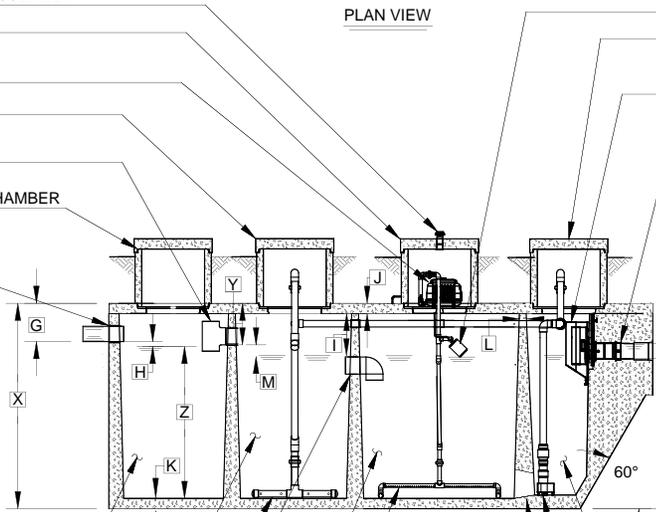
PLAN VIEW



FLOW EQUALIZATION DEVICE DETAIL

NORWECO FRESH AIR VENT ASSEMBLY  
 AERATION CHAMBER RISER CASTING WITH VENTED LID  
 MODEL A100 AIR PUMP  
 ANOXIC CHAMBER RISER CASTING WITH LID  
 TRANSFER TEE

OPTIONAL PRETREATMENT CHAMBER RISER CASTING WITH LID  
 APPROVED SEALANT OR SEALING DEVICE



SECTION A-A

HIGH WATER ALARM FLOAT  
 CLARIFICATION CHAMBER RISER CASTING WITH LID

FLOW EQUALIZATION DEVICE (SEE DETAIL)  
 SOLVENT WELD CONNECTION

4" DIAMETER TRANSFER PIPE  
 FILTER MEDIA

OUTLET TEE

HYDRO-KINETIC FILTER

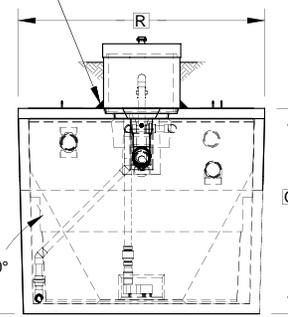
INFLUENT CHAMBER

CLARIFICATION CHAMBER

MODEL SD103 RECIRCULATION PUMP

CAST-IN AERATION CHAMBER TRANSFER PORT

GROUT OR SYNTHETIC SEAL



OUTLET END VIEW

PRETREATMENT CHAMBER  
 ANOXIC CHAMBER  
 MIXING BAR  
 SUBMERGED TRANSFER PORT

NOTE: PRETREATMENT CHAMBER MINIMUM REQUIREMENTS SHALL BE: 400 GALLONS CAPACITY, 7 GALLONS PER INCH OF LIQUID LEVEL AND 9 INCHES OF FREEBOARD.

GENERAL NOTES:

- FALL THROUGH THE HYDRO-KINETIC PLANT FROM INLET INVERT TO OUTLET INVERT IS FIVE INCHES. INLET INVERT IS TWELVE INCHES BELOW TANK TOP.
- ON DEEPER INSTALLATIONS, PRECAST RISERS MUST BE USED TO EXTEND CASTINGS TO GRADE. INSPECTION COVERS MUST BE DEVELOPED TO WITH TWELVE INCHES OF GRADE.
- TANK REINFORCED PER ACI STD. 318.
- REMOVABLE COVERS ON RISERS WEIGH IN EXCESS OF SEVENTY-FIVE POUNDS EACH TO PREVENT UNAUTHORIZED ACCESS.
- CONTACT THE LOCAL, LICENSED HYDRO-KINETIC® DISTRIBUTOR FOR ELECTRICAL REQUIREMENTS.

PROJECT ENGINEER'S APPROVAL:  
 I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

DATE: \_\_\_\_\_

NAME: \_\_\_\_\_

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NAME: \_\_\_\_\_

CRITICAL DIMENSIONS

A	1'-0"	N	0'-3"
B	3'-4"	O	1'-4"
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D	4'-5"	Q	5'-0"
E	3'-7"	R	6'-0"
F	12'-2"	S	1'-5"
G	1'-0"	T	3'-9"
H	0'-1"	U	4'-0"
I	1'-0"	V	
J	0'-3"	W	
K	0'-3"	X	
L	0'-2"	Y	
M	0'-3"	Z	

U.S. AND FOREIGN PATENTS PENDING		10-23-2013   A DRAWN BY: SSS APPROVED BY: JMM DATE: 5-4-2013 SCALE: NTS
		LOW PRO HYDRO-KINETIC® MODEL 600 FEU WASTEWATER TREATMENT SYSTEM © MMXIII <small>THIS DRAWING IS THE PROPERTY OF NORWECO. IT IS TO BE USED ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED HEREON. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT WRITTEN PERMISSION FROM NORWECO.</small>

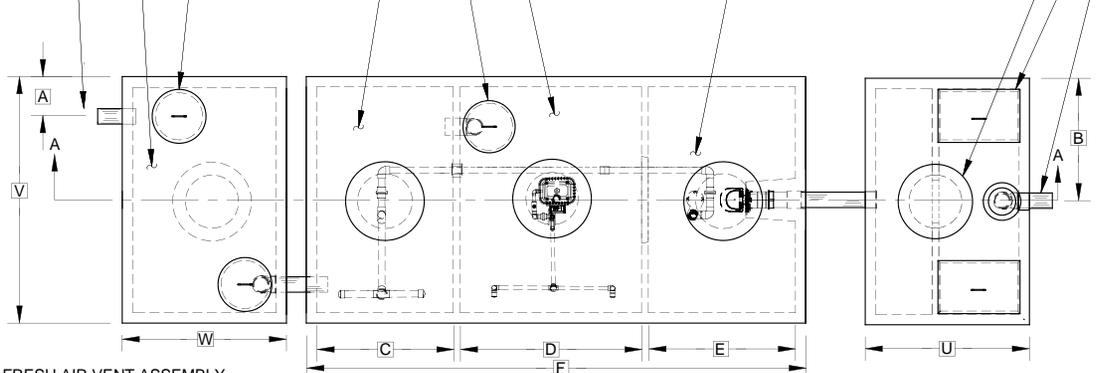
NOTE: TOTAL SYSTEM CAPACITY: 1,820 GALLONS  
 RATED CAPACITY: 500/600 GALLONS PER DAY

REMOVABLE INSPECTION COVER WITH CAST-IN-PLACE HANDLE  
 PRETREATMENT CHAMBER  
 APPROVED SEALANT OR SEALING DEVICE

ANOXIC CHAMBER

REMOVABLE INSPECTION COVER WITH CAST-IN-PLACE HANDLE  
 AERATION CHAMBER  
 CLARIFICATION CHAMBER

4" DIAMETER EFFLUENT LINE  
 REMOVABLE INSPECTION COVER WITH CAST-IN-PLACE HANDLE  
 HYDRO-KINETIC FILTER RISER CASTING WITH LID

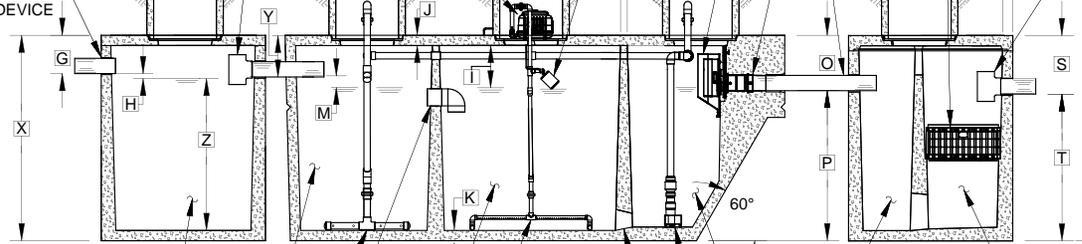


PLAN VIEW

NORWECO FRESH AIR VENT ASSEMBLY  
 AERATION CHAMBER RISER CASTING WITH VENTED LID  
 MODEL A100 AIR PUMP  
 ANOXIC CHAMBER RISER CASTING WITH LID  
 TRANSFER TEE

OPTIONAL PRETREATMENT CHAMBER RISER CASTING WITH LID

APPROVED SEALANT OR SEALING DEVICE



SECTION A-A

PRETREATMENT CHAMBER  
 ANOXIC CHAMBER  
 MIXING BAR  
 SUBMERGED TRANSFER PORT

DIFFUSER BAR  
 AERATION CHAMBER

HIGH WATER ALARM FLOAT  
 CLARIFICATION CHAMBER RISER CASTING WITH LID  
 FLOW EQUALIZATION DEVICE (SEE DETAIL)  
 SOLVENT WELD CONNECTION  
 4" DIAMETER TRANSFER PIPE  
 FILTER MEDIA  
 OUTLET TEE

HYDRO-KINETIC FILTER  
 INFLUENT CHAMBER  
 CLARIFICATION CHAMBER  
 MODEL SD103 RECIRCULATION PUMP  
 CAST-IN AERATION CHAMBER TRANSFER PORT

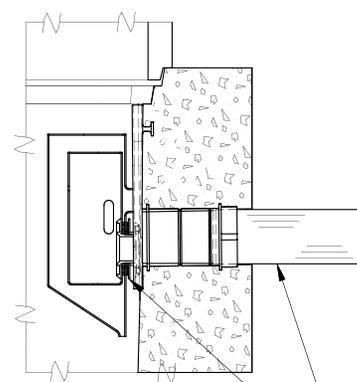
HYDRO-KINETIC FILTER  
 INFLUENT CHAMBER  
 CLARIFICATION CHAMBER  
 MODEL SD103 RECIRCULATION PUMP  
 CAST-IN AERATION CHAMBER TRANSFER PORT

NOTE: PRETREATMENT CHAMBER MINIMUM REQUIREMENTS SHALL BE: 400 GALLONS CAPACITY, 7 GALLONS PER INCH OF LIQUID LEVEL AND 9 INCHES OF FREEBOARD.

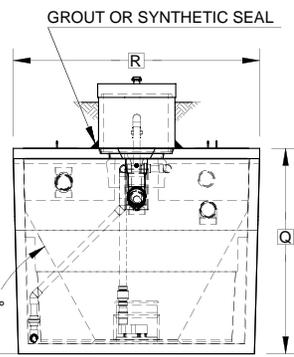
NOTE: TOTAL SYSTEM CAPACITY: 1,820 GALLONS  
 RATED CAPACITY: 500/600 GALLONS PER DAY

GENERAL NOTES:

- FALL THROUGH THE HYDRO-KINETIC PLANT FROM INLET INVERT TO OUTLET INVERT IS FIVE INCHES. INLET INVERT IS TWELVE INCHES BELOW TANK TOP.
- ON DEEPER INSTALLATIONS, PRECAST RISERS MUST BE USED TO EXTEND CASTINGS TO GRADE. INSPECTION COVERS MUST BE DEVELOPED TO WITH TWELVE INCHES OF GRADE.
- TANK REINFORCED PER ACI STD. 318.
- REMOVABLE COVERS ON RISERS WEIGH IN EXCESS OF SEVENTY-FIVE POUNDS EACH TO PREVENT UNAUTHORIZED ACCESS.
- CONTACT THE LOCAL, LICENSED HYDRO-KINETIC® DISTRIBUTOR FOR ELECTRICAL REQUIREMENTS.



GASKETED DISCHARGE FLANGE ASSEMBLY  
 OUTLET COUPLING TO 4" DIAMETER EFFLUENT LINE  
 FLOW EQUALIZATION DEVICE DETAIL



OUTLET END VIEW

PROJECT ENGINEER'S APPROVAL:  
 I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

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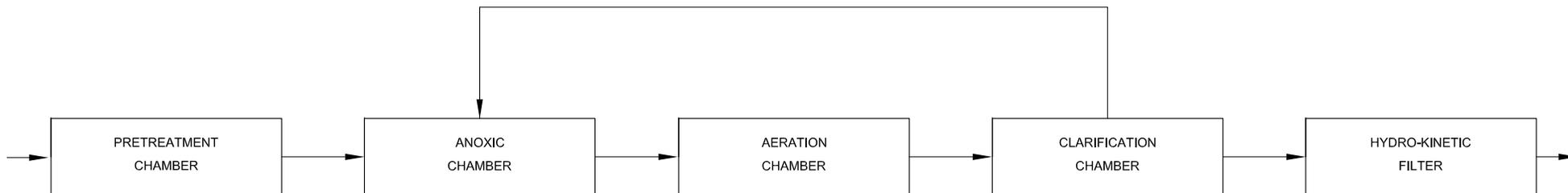
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K	0'-3"	X	
L	0'-2"	Y	1'-1"
M	0'-3"	Z	

U.S. AND FOREIGN PATENTS PENDING		10-23-2013   A SSS
		APPROVED BY: JMM DATE: 4-17-13 SCALE: NTS
© MMXIII	LOW PRO CONVERSION HYDRO-KINETIC® MODEL 600 FEU WASTEWATER TREATMENT SYSTEM	DRAWING NO. PC-5-1008



U.S. AND FOREIGN PATENTS PENDING		<b>norweco</b>		REVISION DATE	REVISION
				DESIGNED BY	SSS
© MMXIII		HYDRO-KINETIC SYSTEM FLOW CHART		APPROVED BY	JMM
				DATE	11-05-2013
				SCALE	NA
THIS DRAWING IS THE PROPERTY OF NORWECO. IT IS TO BE USED ONLY FOR THE PROJECT AND NOT BE COPIED OR REPRODUCED IN WHOLE OR IN PART WITHOUT THE PERMISSION FROM NORWECO.		DRAWING NO.	PC-7-4055		