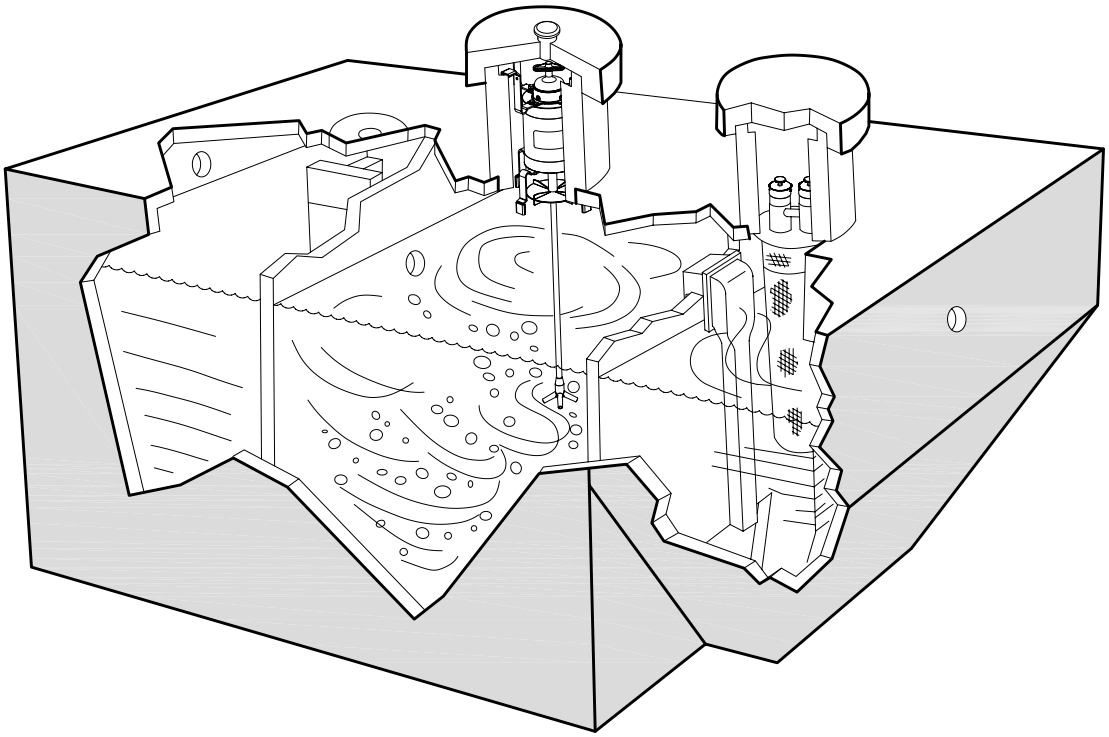
SINGULAIR®

INDIVIDUAL HOME WASTEWATER TREATMENT PLANT with

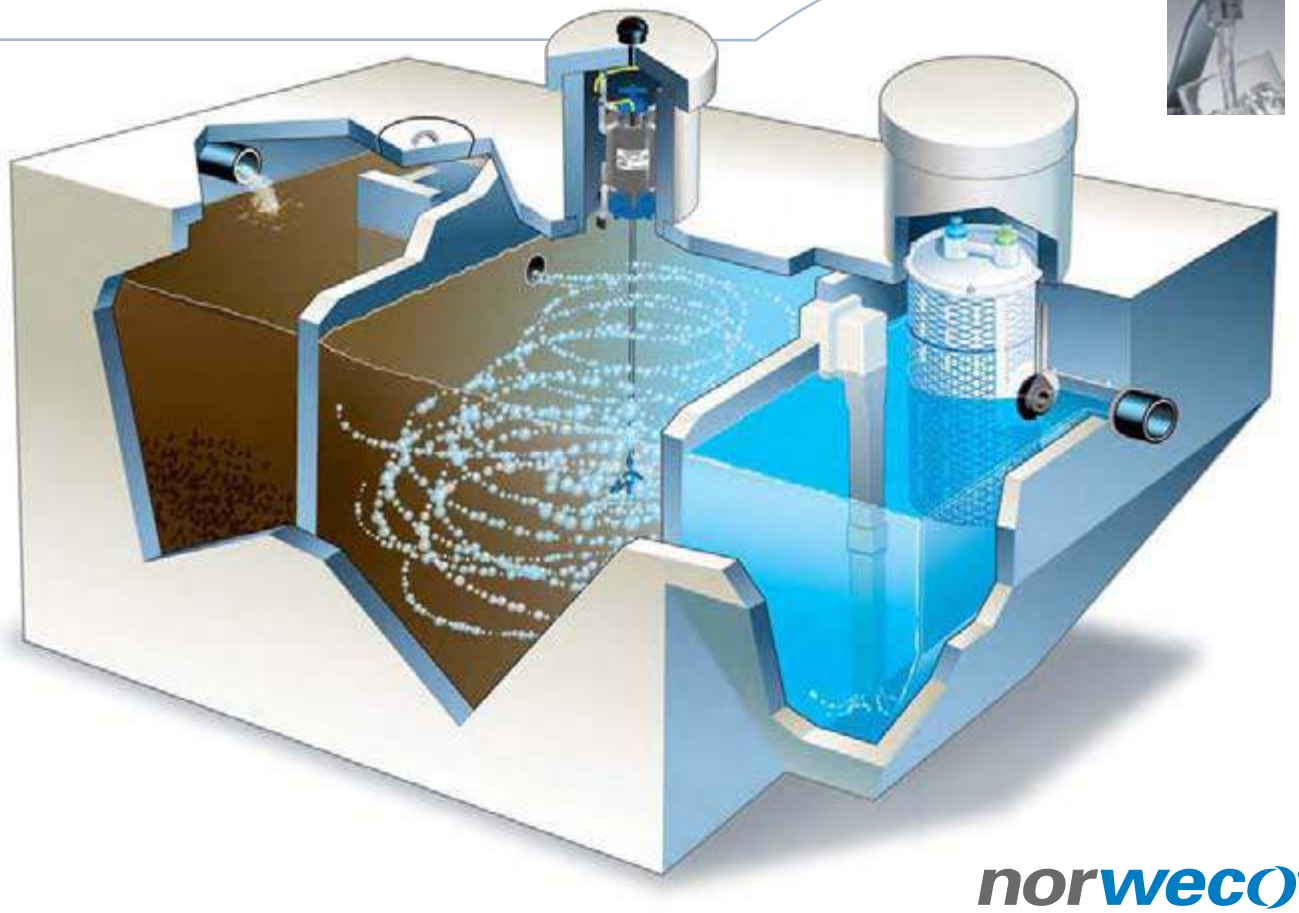
BIO-KINETIC® SYSTEM



PROGRESS THROUGH norweco SERVICE SINCE 1906

OREGON OPERATION & MAINTENANCE STANDARDS

SINGULAIR®



norweco®

Engineering the future of water and wastewater treatment

SINGULAIR®

A dynamic combination of electro-mechanical equipment, solid state technology and web-based monitoring that translates to increased property value, performance certified for you

The new state-of-the-art Singulair treatment system is the trouble-free, energy-efficient alternative to that out-dated, unmanageable septic tank. It sets a new standard for properties that are not connected to centralized sewers. It quietly, efficiently and automatically treats all incoming wastewater, returning harmless effluent to the environment in just 24-hours. Because it operates only 30-minutes every hour, the new Singulair uses half the energy required by continuous-run systems.

We've been providing progress through service since 1906. When you consider the facts presented in this brochure, you will see why Norweco is recognized everywhere as providing today's answer for the protection of 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. Everyone at Norweco is committed to shaping the future of our industry.

engineering the future

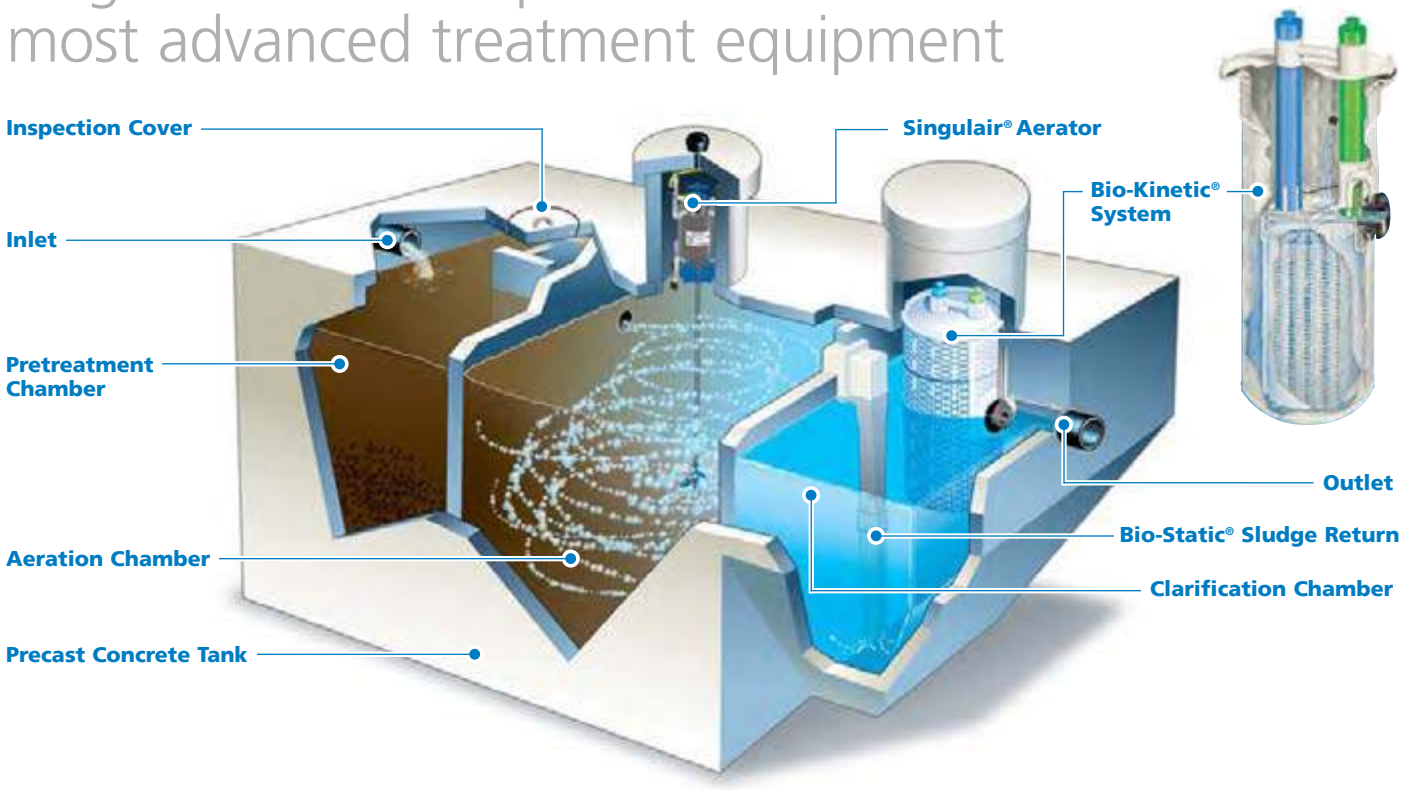
of water and wastewater treatment

Specify Singulair®

Your local Norweco distributor is fully trained to install your Singulair System and any other Norweco product you choose to protect your environment. Each of our distributors has completed a nationally accredited Singulair factory-training program.

The Singulair System comes to you complete, including delivery, tank setting, equipment installation, plant start-up and service. A series of service and adjustment inspections are scheduled 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 Norweco distributor.

Singulair® rivals the performance of the world's most advanced treatment equipment



Inlet
Untreated wastewater enters the system here.

Pretreatment Chamber
Wastewater enters at the Singulair inlet and is equalized here as anaerobic bacteria and gravity precondition it.

Aeration Chamber
Here, safe, living aerobic bacteria convert the wastewater into stable substances. Flow equalization maximizes this biological oxidation and assures 24-hour retention and treatment.

Aerator provides complete treatment
Our exclusive aerator infuses the fresh air that safe, living micro-organisms require to fully digest and treat wastewater inside the Aeration Chamber. Powered by our 1725 RPM, 115 volt, fractional horsepower motor, our quiet, reliable aerator is inexpensive to operate, reduces heat build up and dramatically increases bearing life. Each aerator is precision engineered, tested and certified to operate only 30-minutes per hour. Only the stainless steel aspirator shaft and reinforced nylon aspirator come in contact with liquid in the Aeration Chamber.

Clarification Chamber
Flow equalization enhances the settling of biologically active substances inside the Clarification Chamber. Wastewater has now been converted into clarified liquids in this chamber.

Flow Equalization Ports
They control the flow through all upstream and downstream processes and they regulate the amount of treated effluent that can enter the Bio-Kinetic System.

Bio-Kinetic® System
Constructed entirely of plastic and rubber components that are impervious to this environment, our Bio-Kinetic System combines filtration, settling, non-mechanical flow equalization, optional disinfection, adjustable outlet weir and optional dechlorination features into a single, revolutionary package.

Precast Concrete Tank
Every Singulair System is constructed of high quality, non-corrosive materials under our rigid quality control standards. The tank, access risers and cover are reinforced precast concrete manufactured locally by your factory-trained, licensed Norweco distributor.

Inspection Cover
Access is safe and easy.

Outlet
Only a clear, safe and odorless liquid exits the system here for return to your environment.

SERVICE PRO® Control Center
EVERY SINGULAIR AERATOR IS INSTALLED WITH A SOLID STATE ELECTRICAL CONTROL CENTER. EACH IS EQUIPPED WITH RESETTABLE CURRENT SENSOR, ON/OFF SELECTOR SWITCH, RED WARNING LIGHT, TIME CLOCK, AUDIBLE ALARM, AUXILIARY INPUTS AND FCC LICENSED AUTODIALER FOR REMOTE MONITORING OF INDIVIDUAL COMPONENTS.

comprehensive protection, guaranteed

Singulair is warranted against defects in material and workmanship under normal use and service by a comprehensive 50 year Warranty and Exchange Program. This 2 year Limited Warranty and 48 year Exchange provides single source protection and covers all system components. Complete Warranty and Exchange information, a Warranty Registration Card and Owner's Manual are included with purchase.

The Singulair Bio-Kinetic System components have been listed, licensed and/or certified by each of the following agencies/organizations.

norweco®

Engineering the future of water and wastewater treatment

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Norwalk, Ohio, U.S.A. 44857-1156
PH: 419.668.4471
FAX: 419.663.5440
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 all over the world.

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

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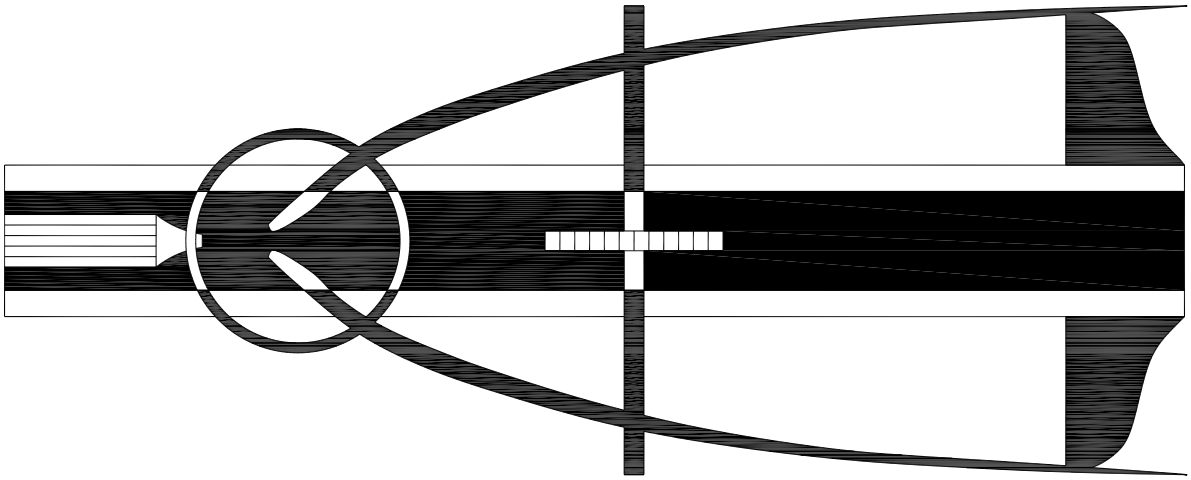
SINGULAIR® BIO-KINETIC®

WASTEWATER TREATMENT SYSTEM MODEL TNT

SPECIFICATIONS

GENERAL SPECIFICATIONS

The contractor shall furnish and install one complete Singulair Bio-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 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 Singulair Model TNT as manufactured by Norweco, Inc., Norwalk, Ohio, USA. Systems utilizing fiberglass, steel, or plastic tankage are subject to floatation when dewatered and shall not be considered for this application.



The wastewater treatment system shall include precast concrete tankage providing separate pretreatment, aeration and final clarification chambers. The tankage shall be furnished with cast-in-place inlets, submerged transfer ports, aerator mounting casting with removable cover, cast-in-place molded plastic vent assembly, cast-in-place outlet couplings and Bio-Kinetic system mounting casting with removable cover. Principal items of electro-mechanical equipment supplied with the Singulair system shall be a 1725 RPM mechanical aerator, UL listed Service Pro control center with MCD technology, Bio-Static sludge return and Bio-Kinetic tertiary treatment device for flow equalization and final filtration of system effluent.

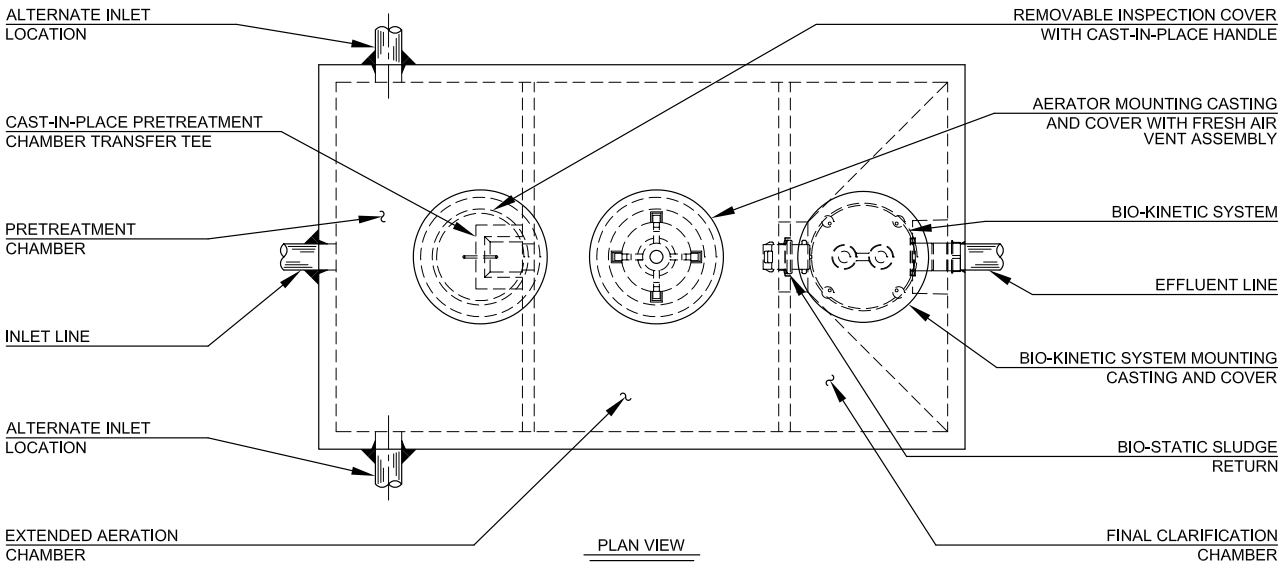
SINGULAIR®

OPERATING CONDITIONS

Total holding capacity of the system shall provide a minimum of 48 hour retention of the daily flow. The pretreatment chamber shall provide at least 18 hour retention, the extended aeration chamber shall provide at least 24 hour retention, and the clarification chamber shall provide at least 6 hour retention. The non-mechanical flow equalization device shall increase each 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

The pretreatment chamber shall be an integral part of the wastewater treatment system. All domestic wastewater shall be preconditioned and flow equalized while passing through the pretreatment chamber prior to being introduced to the extended aeration 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 equalized flow from the center area of the chamber is displaced to the extended aeration chamber. The discharge tee and transfer port shall be of adequate size to handle a peak flow factor of 4 without restricting the outlet and disturbing hydraulic displacement to the extended aeration 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.

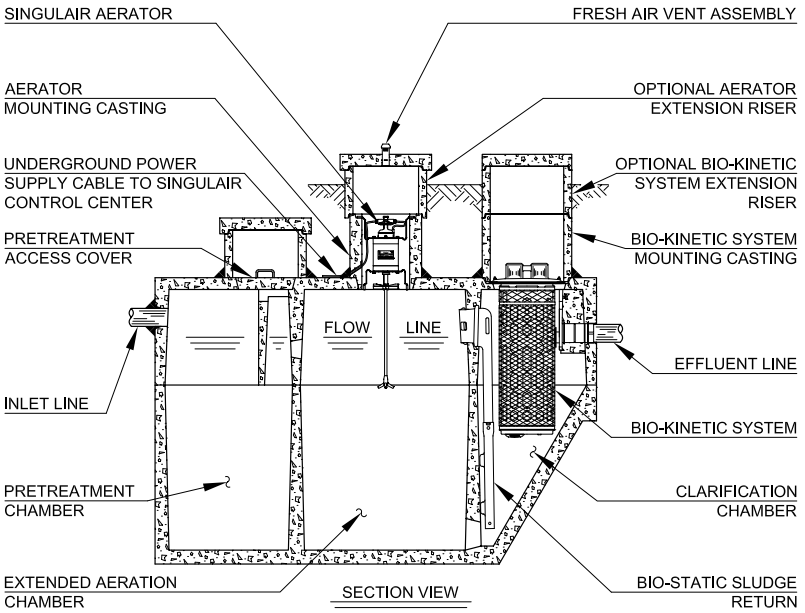


AERATION CHAMBER

The extended aeration chamber shall provide in excess of 24 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. Its performance shall also eliminate turbulence in other zones of the clarifier. Liquid shall be hydraulically displaced from the inlet zone to the sludge return zone. Hydraulic currents shall sweep settled sludge from the hoppered walls and return these solids via the inlet zone to the aeration chamber. As solids are removed, liquid is displaced to 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 sludge return 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 for final filtration and discharge from the system. Non-mechanical equalization of the flow, through all 5 independent zones, shall provide optimal settling and clarification.



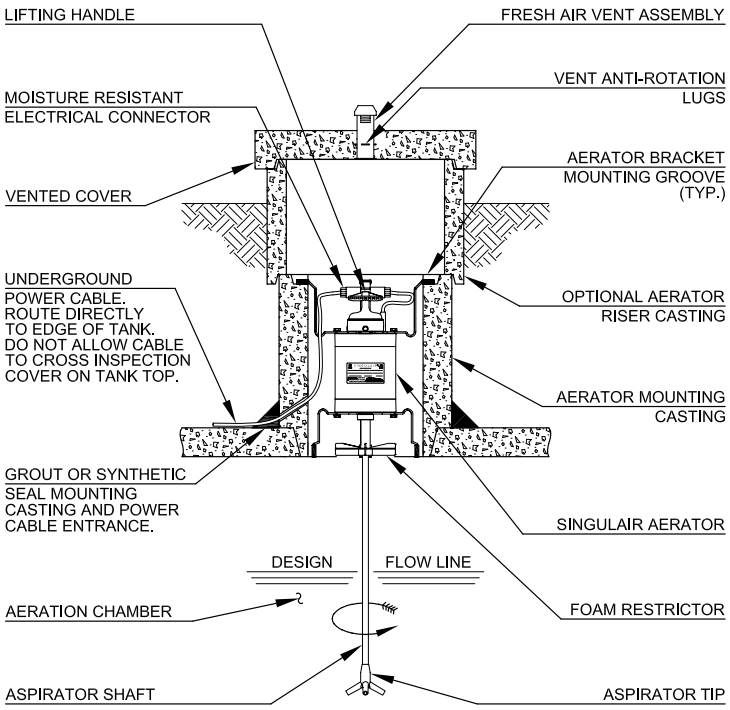
SECTION VIEW

BIO-STATIC® SLUDGE RETURN

A Bio-Static sludge return shall be installed into the cast-in-place opening(s) in the aeration/clarification chamber wall to provide positive return of settled solids. Aeration chamber hydraulic currents shall enter the sludge return(s) and be directed into the sludge return zone of the clarification chamber. The Bio-Static sludge return shall accomplish resuspension and return of settled solids without disturbing the clarified liquid in the final settling zone and outlet zone.

MECHANICAL AERATOR

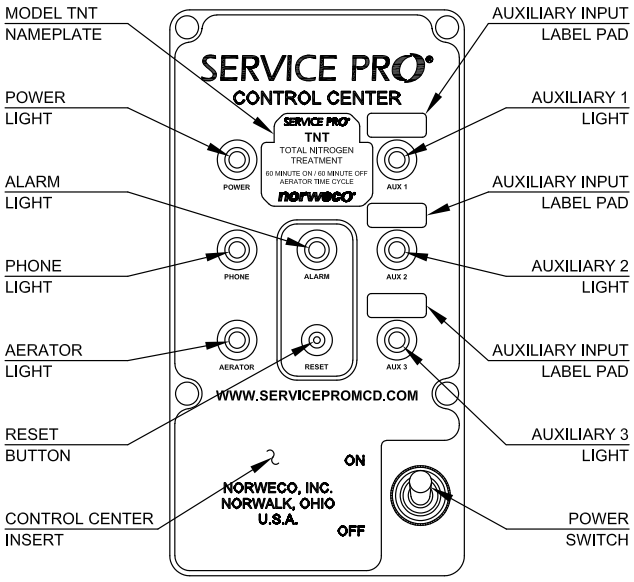
Each Singulair aerator shall be installed in a concrete aerator mounting casting above the aeration chamber. Fresh air shall be supplied through a molded plastic vent assembly cast into the concrete access cover above the aerator. The Singulair aerator shall include plated mounting brackets, NEMA 6 rated electrical connector, fractional horsepower motor, molded plastic lifting handle, molded plastic air intake screens, molded plastic foam restrictor, stainless steel aspirator shaft and molded glass-filled nylon aspirator tip. The motor shall contain precision manufactured o-ring type seals installed between the motor shell and the machined aluminum endbells to insure watertight integrity is maintained. Molded Viton elastomer shaft seals shall be utilized to protect the bearings from contamination. Only the stainless steel aspirator shaft and glass-filled nylon aspirator tip shall be installed in contact with the liquid. There shall be no submerged electrical motors, bearings, or fixed air piping in the aeration system. Singulair aerator motors shall be designed not to exceed the motor nameplate rating when installed and operated as recommended for the system. The fractional horsepower aerator motor shall be equipped with a foam restrictor to protect the motor against high water and foam. The motor shall be 4 pole, 1725 RPM, 115 volt, 60 Hertz, single phase, ball bearing constructed with a 1.0 service factor. It shall draw less than 4.0 amps when operating at the rated nameplate voltage. Aerator motors operating at speeds in excess of 1800 RPM experience increased bearing wear, increased operating costs and heat build up, and shall not be considered for this application.



BIO-KINETIC®

SERVICE PRO® CONTROL CENTER

The Service Pro control center with MCD technology shall provide Monitoring, Compliance and Diagnostic functions for the Singulair treatment plant using a microprocessor based platform. The Service Pro control center shall contain nonvolatile memory to prevent loss of programming in the event of a power failure. The pre-wired controls shall be mounted in a lockable NEMA rated enclosure designed specifically for outdoor use. Each Service Pro control center shall be a UL listed assembly and shall include an alarm light, reset button, power switch, power light, phone light, aerator alarm light and three auxiliary alarm lights. The control center shall monitor all treatment system operating conditions including aerator over current, aerator under current or open motor circuit. In the event the control center detects one of these conditions, power to the aerator shall be interrupted, a diagnostic sequence shall begin and the visual alarm shall activate. After a programmed recovery interval, an automatic restart attempt shall be initiated. If normal aerator operation does not resume during 24 programmed recovery and restart cycles, the audible alarm shall activate and the telemetry system shall report the specific condition to the Service Pro monitoring center. In the event that any of the auxiliary inputs detect abnormal operation of the treatment system auxiliary equipment, the audible and visual alarms shall immediately activate and the telemetry system shall report the alarm condition to the monitoring center. The service provider shall automatically be notified by the Service Pro monitoring center of the specific alarm condition using phone, fax or email.



SERVICE PRO® MONITORING CENTER

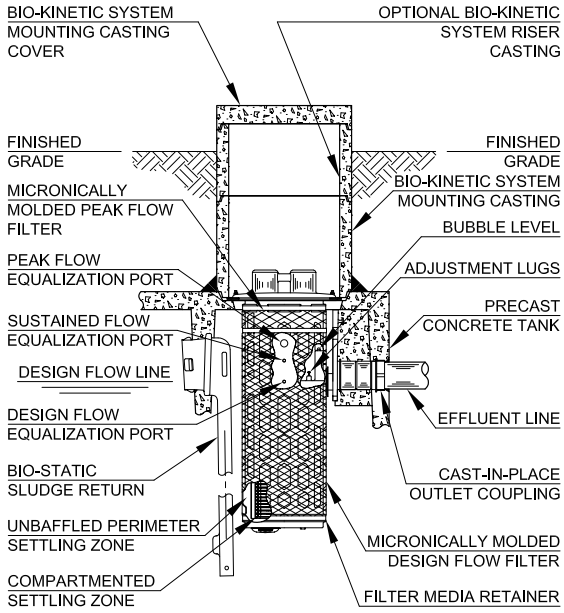
The Service Pro monitoring center shall include a 128 bit encrypted password protected website for interface with the monitoring center database. Access to the secure website shall be obtained through a unique user name and password that provides tiered access to data from monitored treatment systems. Tiered access levels shall include distributors, service providers, regulatory agencies and individual system owners. Distributors and service providers shall be able to create accounts, maintain service records and grant regulatory agencies access to the information. 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 maintained in geographically isolated locations.

www.servicepromcd.com

SPECIFICATIONS

BIO-KINETIC® SYSTEM

A Bio-Kinetic system shall be installed in the mounting casting(s) above the clarification chamber. Each Bio-Kinetic system shall provide non-mechanical flow equalization through all plant processes including pretreatment, aeration, clarification, tertiary filtration, chlorination and dechlorination. The assembly 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, flow distribution deck, lifting handles, level indicator, adjustment lugs, unbaffled perimeter settling zone, solids contact zone, vertical inlet zone, compartmented settling zone consisting of 42 baffled chamber plates, effluent stilling well, final discharge zone, adjustable outlet weir, 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 plastic outlet coupling. The outlet coupling shall accept a 4" diameter, Schedule 40, PVC pipe. Each Bio-Kinetic system shall be installed with the inverts of the design flow equalization ports located at the normal liquid level of the clarifier. If intermittent flow rates exceed the capacity of the design flow ports, flow shall be held upstream until the intermittent flow dissipates. If the intermittent flow continues to increase, the liquid level may reach a pair of sustained flow equalization ports. With four ports in use, flow through the system increases while continuing to provide flow equalization to all upstream and downstream processes. Peak flow equalization ports are supplied but should not be required in a properly sized system.



FLOW EQUALIZATION

The wastewater treatment system shall include a non-mechanical, demand use, flow equalization device. 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 500 gallon per day NSF Standard 40 design loading schedule, minimum performance of the device shall equalize daily flow an average of 48%.

WARRANTY AND EXCHANGE PROGRAM

The manufacturer shall provide a two year limited warranty for the Singulair aerator, Service Pro control center, Bio-Kinetic system and Singulair precast concrete tank. A comprehensive exchange program offers Singulair owners an additional forty-eight years of equipment protection. The distributor shall provide warranty and exchange program details 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.

SINGULAIR® MODEL TNT DATA CHART

Designation:	**500 GPD**
Daily Treatment Capacity (Gallons Per Day)	500
Number of Singulair Aerators	1
Number of Bio-Kinetic Systems	1
Number of Bio-Static Sludge Returns	1
Drawing Number (PC-5)	7102

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SINGULAIR® BIO-KINETIC®

WASTEWATER TREATMENT SYSTEM WITH SERVICE PRO® CONTROL CENTER

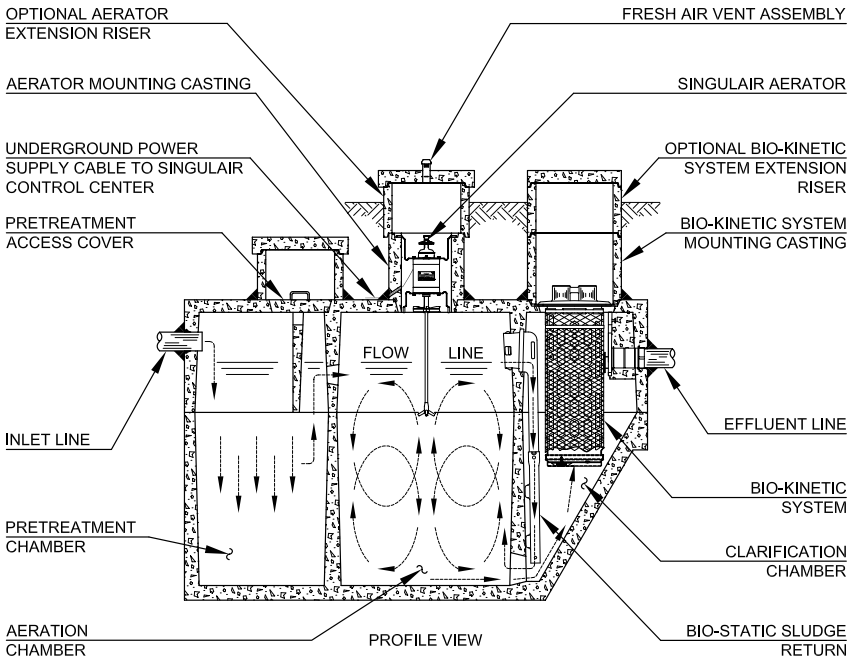
MODEL TNT OWNER'S MANUAL

INTRODUCTION

The Singulair system is the finest equipment available and utilizes the most up-to-date wastewater treatment technology. 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 SINGULAIR® SYSTEM WORKS

Developed to serve homes and small businesses beyond the reach of city sewers, the Singulair system employs the extended aeration process. Similar to the treatment method used by most municipal wastewater treatment facilities, this process involves a natural, biological breakdown of the organic matter in wastewater.



Wastewater enters the pretreatment chamber where anaerobic bacterial action combines with the effects of gravity to precondition the waste before it flows into the aeration chamber. Once in the aeration chamber, aerobic bacteria utilize the organic matter in the wastewater to biologically convert the waste into stable substances. Following aeration, flow is transferred to the clarification chamber where the effects of gravity settle out biologically active material. The Bio-Static sludge return, located in the clarification chamber, creates hydraulic currents that gently transfer settled particles back to the aeration chamber. As clarified liquids pass through the Bio-Kinetic system, they are filtered, settled and flow equalized. As a result, complete pretreatment, aeration, clarification and final filtration are assured. The Singulair system reliably protects you, your property and the environment.

FEATURES AND ADVANTAGES

Singulair tanks are reinforced precast concrete, manufactured by the licensed Norweco distributor. Internal walls and baffles are cast-in-place to insure uniformity and maximum strength. Risers and access covers are either heavy duty plastic or concrete construction. All components within the system that will contact the wastewater are constructed entirely of molded plastic, stainless steel or rubber.

The Singulair aerator is powered by a 1725 RPM, 115 volt, 60 hertz, single-phase, fractional horsepower motor. It is the only electrically powered component in the Singulair system. The aerator has been designed specifically for use in the Singulair system. It costs less to operate and consumes fewer kilowatt hours of electricity than most major appliances.

Singulair aerators are supplied with a Service Pro control center with MCD technology. The NEMA rated control center contains a power switch and time clock that control aerator 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 and final filtration is accomplished within the Singulair tank by the Bio-Kinetic system. This revolutionary device is installed in the clarification chamber and connected to the system outlet. Optional chlorination and dechlorination may be included in the Bio-Kinetic system if required. All Singulair components work together to assure complete pretreatment, aeration, clarification and final filtration.

SINGULAIR® SYSTEM PERFORMANCE

Rivaling the performance of the most advanced wastewater treatment plants in the world, the Singulair system complies with USEPA wastewater treatment guidelines for secondary treatment systems and meets all requirements of NSF/ANSI Standard 40. In ecologically sensitive areas, the most stringent effluent standards are 10 mg/L CBOD and 10 mg/L TSS. Rated Class I after successfully completing the 7 month Standard 40 test protocol, the Model TNT system averaged effluent of 4 mg/L CBOD, 9 mg/L TSS and 12 mg/L Total Nitrogen.

OPERATIONAL REQUIREMENTS

The Singulair 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 Singulair 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, interfere with biological treatment, accumulate in the treatment system and 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 Singulair control center must be wired to a dedicated 115 VAC, 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.

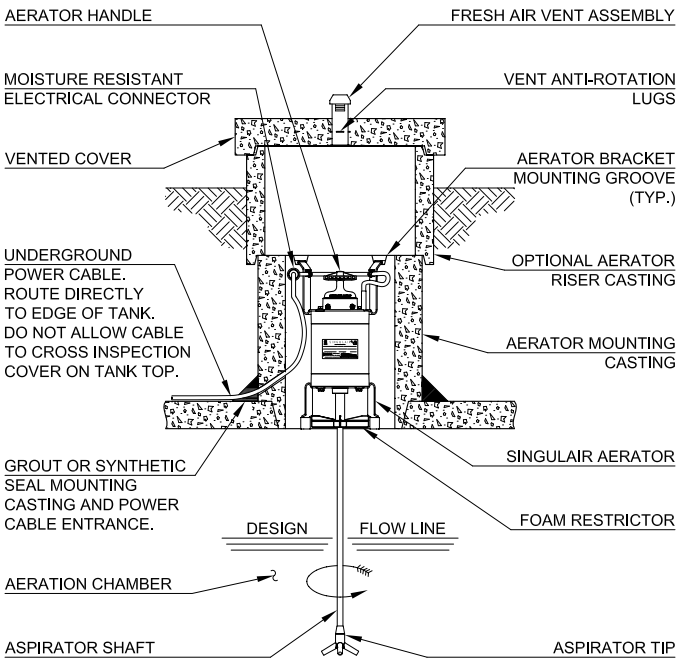
CAUTION: Any time service is required, first shut off the dedicated circuit breaker in the main electrical service panel. Next, shut off the power switch in the Singulair control center. Failure to do so could result in personal injury or equipment damage.

SINGULAIR® AERATOR

The aerator has been specifically designed for use in the Singulair system and includes special alloy and molded plastic parts to prolong aerator life. Aerator bearings are pre-lubricated and sealed. Singulair aerators are installed in a concrete mounting casting above the aeration chamber. Fresh air enters the aerator through four intake ports located under the aerator handle. The air is drawn down the hollow aspirator shaft where it is introduced below the liquid surface. Only the molded plastic aspirator and the lower portion of the stainless steel aspirator shaft are submerged.

The aerator is not designed to run under water and will automatically shut off if a high water condition occurs. If the liquid rises to the level of the foam restrictor, the control center will shut off power to the aerator. Next, an automatic diagnostic sequence begins, as outlined in the section titled “Service Pro Control Center”.

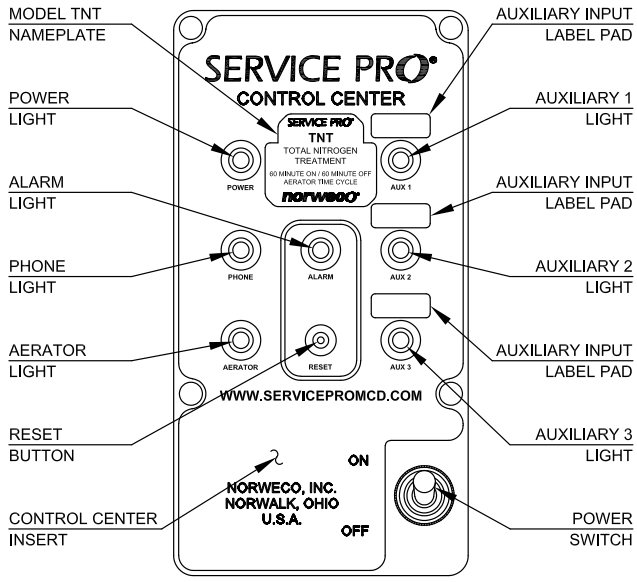
Each Singulair aerator is a precision engineered



electro-mechanical device. Do not remove it from its installed position. Do not attempt any type of repair. Contact your Singulair service provider if service is needed. Unauthorized tampering or repair will void important provisions of the limited warranty and exchange program.

FRESH AIR VENTING SYSTEM

An aerator vent assembly is cast into the concrete access cover above each aerator. The vent assembly supplies fresh air to the aerator, which is drawn through the aspirator 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.



SERVICE PRO® CONTROL CENTER

Every Singulair aerator is supplied with a prewired Service Pro control center featuring MCD technology to permit fully automatic aerator operation. The control center provides MONITORING, COMPLIANCE and DIAGNOSTIC functions complete with telemetry for communication with the Service Pro remote monitoring center. If an alarm condition occurs for any reason within the Singulair system or monitored auxiliary equipment, the red alarm light will flash. If aerator operation has been interrupted, the Service Pro control center will attempt to restart the aerator every five minutes for two hours. If the aerator does not restart after two hours, the audible alarm will sound. If the Singulair system is covered by a Service Pro monitoring agreement, the Singulair service provider will be automatically notified and the alarm condition will be displayed on the remote monitoring center website, **www.servicepromcd.com**. Each control center for the Model TNT system is supplied with a non-adjustable time clock.

SERVICE PRO® MONITORING CENTER

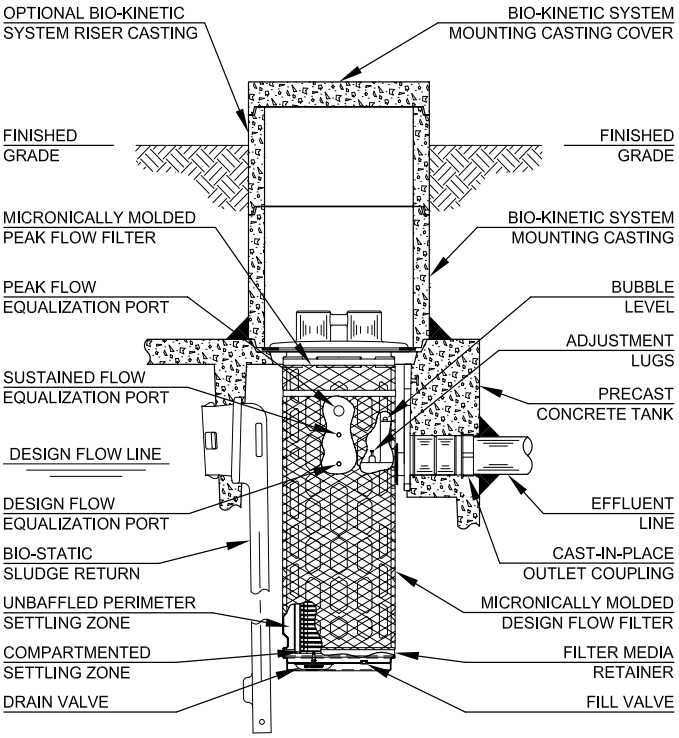
When connected to a telephone line, the control center will automatically notify the Service Pro monitoring center of any service required by the Singulair system or accessory components. The Service Pro monitoring center will automatically record the time and date of any alarm condition and post this information to your system's history record accessible at **www.servicepromcd.com**. The monitoring center will also notify your Singulair service provider that the system needs attention and record the time and date when service is performed. All information regarding your system is available to you on the secure, password protected Service Pro website. Contact your Singulair service provider for your user name and password.

BIO-STATIC® SLUDGE RETURN

Each Bio-Static sludge return is securely installed in the aeration/clarification chamber wall to provide return of settled solids. Aeration chamber hydraulic currents enter the sludge return(s) and are directed through the Bio-Static device into the clarification chamber. The hydraulic currents containing resuspended sludge are directed through the clarification chamber inlet zone and back to the aeration chamber for additional treatment. The Bio-Static sludge return accomplishes resuspension and return of settled solids without disturbing the contents of the clarification chamber. It has no moving parts and does not require service but its operation will be checked by your service provider during each semi-annual service inspection.

BIO-KINETIC® SYSTEM

Bio-Kinetic systems provide non-mechanical flow equalization through all plant processes. The Bio-Kinetic system contains 3 separate filtration zones, 8 independent settling zones. All components are manufactured from plastic, stainless steel or rubber. Do not remove a Bio-Kinetic system from the clarification chamber without disengaging the locking lugs. Your service provider has the necessary training, tools and equipment for removal and cleaning. If your Bio-Kinetic system is in need of service contact your service provider. During each semi-annual service inspection your service provider will remove and clean the Bio-Kinetic system or replace it with a unit from their service stock.



NON-MECHANICAL FLOW EQUALIZATION

The patented design of the Bio-Kinetic system provides non-mechanical flow equalization for the Singulair wastewater treatment plant. Equalization reduces incoming 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 provided by the Bio-Kinetic system 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 design loading pattern used during the NSF/ANSI Standard 40 performance evaluation, the Singulair system equalizes all flow an average of 48%. As a result, hydraulic surges and periods of high wastewater flow are automatically reduced to protect the environment and all treatment plant processes on a demand use, as needed, basis.

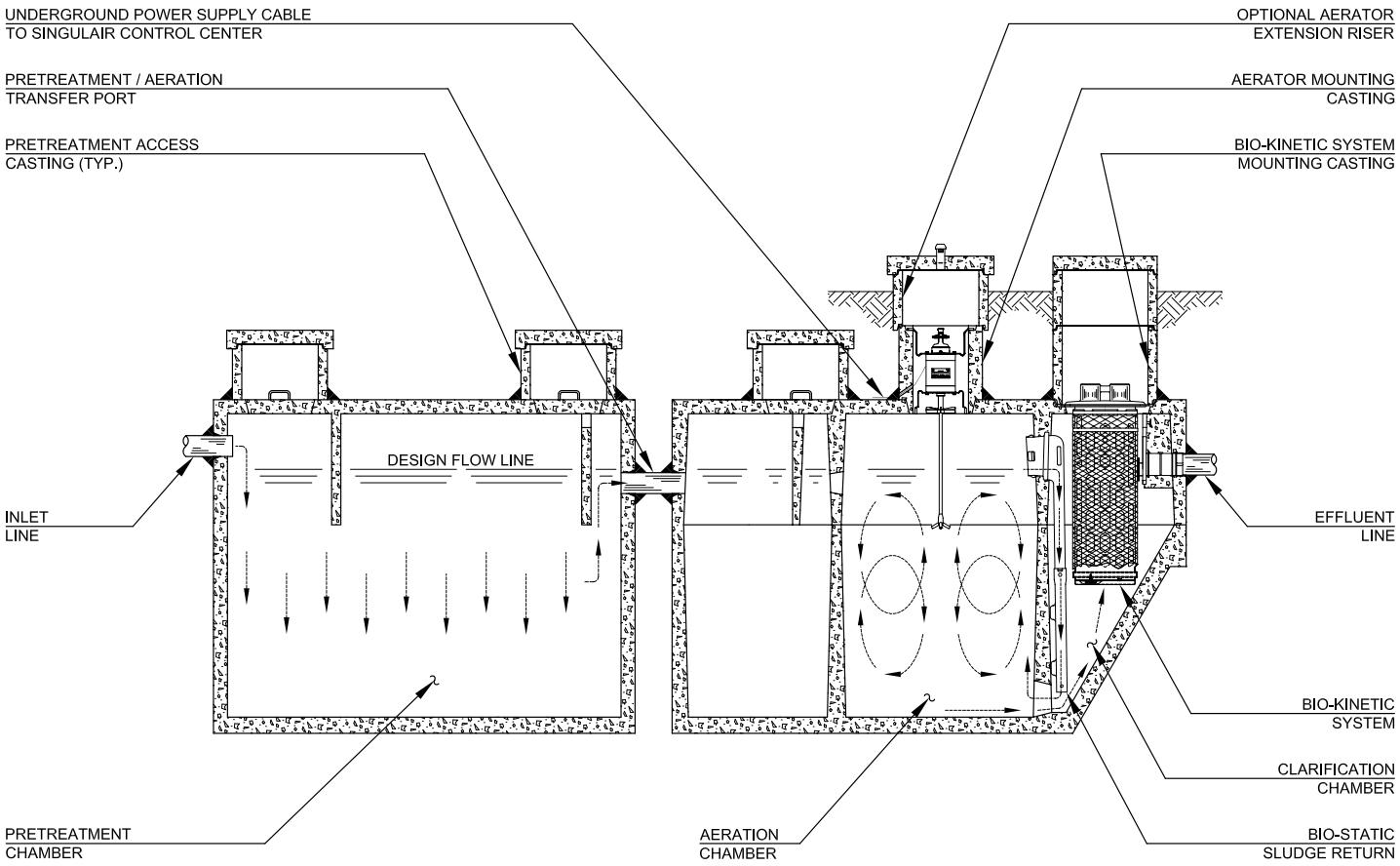
NO OWNER MAINTENANCE

The Singulair system is inspected and serviced by a local, factory-trained service provider, therefore, no owner maintenance is required during the warranty period. The Singulair system does not require pumping as often as a septic tank. Under normal use only the pretreatment chamber should be pumped. How often pumping is necessary depends on system use. The local Singulair service provider will inspect the aeration chamber contents and plant effluent at six month intervals to determine if the pretreatment chamber is discharging excessive solids. Every three years, the pretreatment chamber should be inspected. The pretreatment chamber will normally require pumping at three to five year intervals. Contact your local service provider prior to tank pumping for complete information on removal of equipment, access to individual chambers, coordination of services and proper disposal of tank contents. A tank pumping service licensed by the local regulatory agency must be used for removal and disposal of tank contents. The tank pumper should consult with local authorities to determine the proper disposal method.

If a period of intermittent use, or an extended period of non-use of the Singulair system is anticipated, contact your Singulair service provider for instructions. Your service provider has comprehensive Singulair service instructions and has been factory-trained in troubleshooting procedures. Contact your service provider if you require service or information regarding tank pumping.

SINGULAIR® SERVICE PROGRAM

Semi-annual service inspections, at six month intervals 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 Singulair system. Costs for travel and labor are not charged to the owner. During an inspection, each mechanical aerator, Bio-Kinetic system and other plant components are serviced as outlined in the Singulair Service Manual. After the initial two year service program is completed, the local service provider will provide continued service at the owner's option. The service program should be renewed by the owner to insure maximum system performance.



PROFILE VIEW

Ask your Singulair service provider about a renewable service contract. If you allow service coverage to expire, you can still obtain the professional assistance of a factory-trained technician. 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 Singulair service provider will perform the following services during each service inspection:

- ✓ Check aerator operation
- ✓ Check aerator power consumption
- ✓ Check aerator air delivery
- ✓ Clean stainless steel aspirator shaft
- ✓ Clean aspirator tip
- ✓ Clean fresh air vent in concrete cover
- ✓ Inspect aeration chamber contents
- ✓ Check operation of control center
- ✓ Adjust time clock when required
- ✓ Remove the Bio-Kinetic system
- ✓ Scrape the clarification chamber
- ✓ Inspect the Bio-Static sludge return
- ✓ Inspect outlet coupling
- ✓ Install a clean Bio-Kinetic system
- ✓ Inspect effluent quality
- ✓ Inspect outlet line
- ✓ 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**
- ✓ Mail health department notification

WARRANTY REGISTRATION

A Warranty Registration Card was attached to the Service Pro control center 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 and fifty year aerator exchange program will begin on the date of component shipment from the factory.

If the Service Pro control center is mounted in an outdoor location, remove the aerator model number and serial number record card and store it in a safe location. Otherwise, do not remove this card from the control center. If it is necessary to call your service provider for service, make note of the information on the control center data plate and the aerator serial number before calling. Warranty and service records are cross-indexed by owner name and aerator serial number. Supplying the aerator serial number with the service request will give the service provider a ready reference so that changes in system ownership will not delay service.

SINGULAIR® LIMITED WARRANTY

The Singulair aerator enjoys the distinction of being the only aerator on the market today backed by a fifty year warranty and exchange program. Each Singulair aerator, Service Pro control center, Bio-Kinetic system 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. The two year limited warranty is included in the original purchase price of every Singulair system. The comprehensive aerator exchange program offers Singulair owners an additional forty-eight years of protection. Owners with a Singulair system may exchange any aerator up to fifty years of age for a replacement unit at a prorated cost. If the Singulair aerator fails, do not use or dismantle the unit. The local, licensed distributor has detailed warranty and exchange information and should be contacted for service or replacement instructions.

SERVICE PRO® SECURITY LOG IN

For your convenience, record your **www.servicepromcd.com** access information here:

User name:	**Password:**

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

DISTRIBUTED LOCALLY BY:

220 REPUBLIC STREET
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TELEPHONE (419) 668-4471
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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."* [1] 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."* [2]

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 $CBOD_5$ (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."* [2] 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 (ANSI/NSF Standard No. 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."* [3] 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_5 and $CBOD_5$ 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."*[2]

   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 $CBOD_5$, 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)

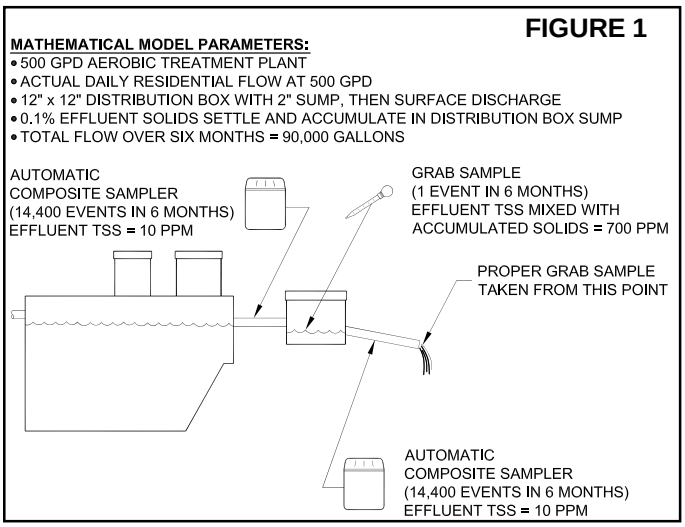
LOCATION OF SAMPLE SITE

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."* [3] 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 $CBOD_5$ 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.

FIGURE 1



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 ($CBOD_5$)	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_2SO_4 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_2SO_4 to pH <2, refrigerate	7 days/28 days*
Oil & Grease	1,000 mL	Grab	Add H_2SO_4 to pH <2, refrigerate	28 days
Total Phosphorus	100 mL	Composite	Add H_2SO_4 to pH <2, refrigerate	28 days
Fecal Coliform	N/A	Grab	Add 0.008% $Na_2S_2O_3$**, 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[4], 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.

REFERENCES

1. American Public Health Association, American Waterworks Association, Water Environment Federation. *Standard Methods for the Examination of Water and Wastewater.* 20th Ed.
2. Water Environment Federation. *Operation of Municipal Wastewater Treatment Plants.* Manual of Practice No. 11, 5th Ed.
3. Water Environment Federation. *Wastewater Sampling for Process and Quality Control.* (1996) Manual of Practice No. OM-1.
4. U.S. Environmental Protection Agency. *Rules and Regulations 40CFR.* (1998) Part 136.3.

PROGRESS THROUGH norweco **SERVICE SINCE 1906**

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norweco® SINGULAIR® BIO-KINETIC®

WASTEWATER TREATMENT SYSTEM

TANK PUMPING INSTRUCTIONS

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

In order to maximize performance, protect system components and insure protection of the surrounding environment, the Singulair system should be thoroughly checked every six months by a factory-trained Norweco service technician. An initial service program that provides a minimum of four 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 Singulair system will periodically require pumping. Because the Singulair 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 aeration and clarification chambers, 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 Singulair 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 Singulair Tank Delivery and Setting instructions.

INTRODUCTION

The Singulair 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 Singulair 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 Singulair system. The pretreatment chamber of the Singulair system is designed to retain non-biodegradable solids and allow biodegradable solids to flow into the aeration chamber. The aerobic treatment process in the Singulair 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 Singulair 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 Singulair 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 six month intervals during the initial warranty period. These routine service inspections will determine if a pretreatment chamber evaluation is necessary. The pretreatment chamber should be evaluated by a factory-trained technician at least every three years to determine if pumping is required. Pumping of this chamber 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

Semi-annual service inspection procedures are outlined in detail in the Singulair Bio-Kinetic System Service Manual. These routine service procedures include inspection of the 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 Singulair Service Manual.

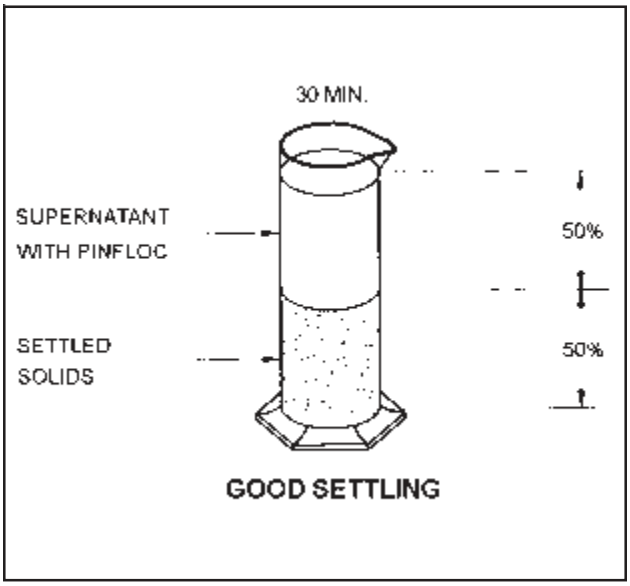
CAUTION: Any time an aerator or service pump is connected or disconnected, first shut off the selector switch in each Singulair control center. Failure to do so could result in personal injury or equipment damage.

1. Remove the vented concrete aeration chamber access cover and set aside.

2. Unplug the aerator and secure the closure cap in position to protect the electrical connector.

3. Lift the aerator straight up out of the access opening and lay it flat on the vented cover. DO NOT bump the aspirator shaft or rest the aerator on the aspirator shaft.

4. Perform a settleable solids test using a graduated cone or other clear container. For this test, make sure the aerator has been running for at least 10 minutes. Collect an aeration chamber sample immediately after turning off and removing the aerator. Refer to the "Settleable Solids Test" section of these instructions for additional details.



5. Loosen the two set screws on the bottom of the intermediate shaft and remove the aspirator shaft.

6. Clean any debris from the aspirator shaft and flush the inside of the shaft with a hose.

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.

Repeat steps 1-8 for Singulair systems with multiple aeration chambers and aerators.

NOTE: Do not replace the aerator(s) until the Bio-Kinetic system(s) have been removed from the clarification chamber and properly serviced.

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 settleable solids test, make sure the aerator has been running for at least 10 minutes. Collect the sample immediately after turning off and removing the aerator and before the aeration chamber contents begin to settle. Using a graduated cone or other clear container, dip the container into the aeration chamber to a depth of $2\frac{1}{2}$ feet. 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 liquid 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 settled solids reading by that amount. A settled solids reading of up to 75% indicates no adjustments are necessary. **NOTE:** The solids should settle and compact 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 clear separation. This should not be interpreted as having excess solids and system operation can continue without adjustment.

A settled solids level greater than 75% indicates excessive solids in the aeration chamber and that the pretreatment chamber may need to be pumped. In this case, a pretreatment chamber evaluation must be performed. Refer to the "Pretreatment Chamber Evaluation" section of these instructions for more details. If the pretreatment chamber evaluation indicates pumping is not required, the aerator operating cycle should be increased. Consult the local regulatory agency and the Singulair Time Clock Setting instructions before adjusting the aerator operating cycle.

The results of the settleable solids test, and any adjustment made to the system time cycle, should be recorded on the Service Inspection Card.

CLARIFICATION CHAMBER INSPECTION

A summary of the clarification chamber and Bio-Kinetic service inspection procedure is listed below. For complete details on clarification chamber service, refer to the Singulair Bio-Kinetic System Service Manual.

1. Remove the system access cover and set aside.

2. Install the Outlet Sealing Tool into the receiving flange to prevent loss of liquid from the Singulair system during service.

3. Remove the Singulair aerator and place the service funnel over the aerator mounting casting.

4. Using the universal tool, remove the flow deck and chamber plate assembly from the Bio-Kinetic system. Place the assembly on the service funnel for cleaning.

5. Using the universal tool, disengage all four black locking lugs to allow for removal of the outer chamber.

6. Lower the fixed handle of the universal tool into the upper lip of the Bio-Kinetic system outer chamber . Turn the handle until the lifting tool is engaged into the lifting rib.

7. The outer chamber is equipped with a drain valve and fill valve to allow for easy removal and reinstallation during service. Begin lifting the outer chamber from the tank. The drain valve will automatically open as the outer chamber is lifted out of the clarification chamber. Remove the outer chamber from the mounting casting and set it on the upside down lid of the service container.

NOTE: Repeat steps 1-8 for clarification chambers with multiple Bio-Kinetic systems.

8. Reinstall the Singulair aerator(s) as outlined in the Singulair Aerator Service Instructions. The aerator(s) must be in operation while the remaining clarification chamber service is performed.

9. 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.

10. With the aerator running, use the hopper scraping tool to gently scrape all areas of the clarification chamber hopper side walls.

11. Complete the clarification chamber service as outlined in the “Clarification Chamber” section of the Singulair Bio-Kinetic System Service Manual.

12. Make appropriate notations on the Singulair Service Inspection Card and on the Owner’s Manual.

EFFLUENT LINE INSPECTION

Check the groundwater relief point installed in the effluent line to make sure it is free of obstruction. An accumulation of paper, fibers, hair or grease indicates that the Singulair 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(s) 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 chamber 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.

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 chamber 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.

WHAT TO PUMP

When pumping is required, normally it is necessary to pump only the pretreatment chamber if the Singulair system has been serviced at regular 6-month intervals. If service has been interrupted for an extended period of time, or if mud or toxic material is present, it may be necessary to pump out the entire system. When pumping, it is not necessary to wash down the compartments unless significant quantities of grease, hair, fibers, mud, toxic substances or biologically untreatable materials are present. The following chart provides volumetric capacities within each Singulair system:

SYSTEM CAPACITY

Singulair Model	Pretreatment Chamber	Total System
500 GPD	450 Gallons	1300 Gallons

HOW TO PUMP THE SINGULAIR SYSTEM

A complete Singulair 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 Singulair 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. Refer to the “System Capacity” table and advise the pumping service what volume of liquid is to be removed from the system.
3. For pumping the pretreatment chamber only, remove the pretreatment chamber access cover and insert a suction hose into the chamber. Lower the hose until it contacts the bottom of the tank. Withdraw the hose approximately 2" and connect the opposite end to the pump being used to evacuate the chamber.
4. Break up the scum mat to facilitate pumping. Activate the pump and remove the pretreatment chamber contents. It is not necessary to wash down the sidewalls or tank bottom.
5. If the solids in the chamber are so concentrated that the suction hose cannot withdraw them, tank contents may be back-flushed to break up the solid matter.
6. If special circumstances require the total system to be pumped, contact the local Norweco Singulair distributor. Each aerator and Bio-Kinetic system must be removed for full access to all chambers and to prevent damage to components.

   NOTE: Access to the contents of the aeration and clarification chambers of Singulair systems should be made only through an aerator mounting casting. Never insert the hose through the Bio-Kinetic system mounting casting.
7. A Singulair system that has been inactive for an extended period of time or that has accumulated mud or dirt during installation may have to be washed down with fresh water and pumped out. This process may have to be repeated for proper system operation.
8. After pumping, fill all chambers to capacity with water. Return all aerators, Bio-Kinetic systems and access covers to their proper locations, as outlined in the Singulair Service Manual. Be sure each control center selector switch is in the “automatic” position, and each enclosure is secured with a tamper evident seal.

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

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SINGULAIR®

TWO YEAR LIMITED WARRANTY FOR THE STATE OF OREGON

Norweco, Inc. warrants every new aerator, control center, Bio-Kinetic System and Singulair precast concrete tank 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 judgment of Norweco, shows evidence of manufacturing defect, provided that the defective component is returned to the factory, freight prepaid, by a licensed Singulair distributor. This limited warranty shall be recognized in effect for two years from the date of Singulair 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 Singulair 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 Singulair system 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 judgment, are the equivalent of the parts being replaced.

Service may occasionally be required for the Singulair system due to damage resulting from accident, improper use, voltage fluctuations greater than +5% of the aerator 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 Singulair two year limited warranty does not include any portion of the customer's wiring, plumbing, drainage, tankage or disposal system, 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 equipment or to any items which have been disassembled, repaired, altered or tampered with, prior to their return to Norweco. Therefore, if a Singulair component part fails to meet Norweco's manufacturing standards or product representations stated herein, do not use or dismantle it. Contact the local licensed Singulair distributor. The distributor 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 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.

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norweco® SERVICE PRO®

CONTROL CENTER WITH MCD TECHNOLOGY

GETTING STARTED WEBSITE INSTRUCTIONS

The Service Pro website is located at **www.servicepromcd.com**. Navigating through the Service Pro website is similar to browsing any other site found on the internet. The computer mouse, on screen cursor and keyboard are the primary tools used to move through the website. To browse the Service Pro website, position the on screen cursor over any hyperlink on the computer screen. A highlighted word is a hyperlink if the cursor changes from an arrow to a hand when it is positioned over the word. Information contained within the hyperlink can be accessed by clicking the left mouse button while the cursor is positioned over it. After pressing the left mouse button the computer screen will display the desired information.

Data fields are the primary building blocks of the Service Pro website. A data field is an area within the site where information can be entered and saved. The computer keyboard is used to enter the data into the fields. Many fields in the Service Pro website have pre-selected lists of options to choose from called drop down lists, identified by the arrow (▾) symbol beside them. Any drop down list can be accessed by clicking the arrow. In order to select an item from the drop down list, position the cursor over the desired response and click the left mouse button.

SERVICE PRO SITE MAP

The website is broken down into five sections to manage the data. These five sections are as follows:

1) Accounts
This area is where specific account information is entered and accessed. The subsections of this area are:

A) Add New Subscriber - Add new subscriber to the monitoring system by entering the subscriber's location, Singulair system, accessories, permit and service contract information.

B) View/Edit Subscriber - Edit subscriber's location, Singulair system, accessories, permit and service contract information.

VIEW/EDIT SUBSCRIBER SCREEN

C) Suspend/Restore Account - Stop and reactivate monitoring to a system.

D) List/Search Accounts - Search and sort subscribers by active, suspended and all accounts.

- ❑ Active Accounts
  - Sort by Subscriber
  - Sort by City
  - Sort by State/Province
  - Sort by Zip/Postal Code
  - Sort by Phone Number
  - Sort by Account Number
- ❑ Suspended Accounts
  - Sort by Subscriber
  - Sort by City
  - Sort by State/Province
  - Sort by Zip/Postal Code
  - Sort by Phone Number
  - Sort by Account Number
- ❑ All Accounts
  - Sort by Subscriber
  - Sort by City
  - Sort by State/Province
  - Sort by Zip/Postal Code
  - Sort by Phone Number
  - Sort by Account Number

2) History
This area is where historical information about an account is accessed. At the request of the distributor, regulatory officials may gain access to this area for accounts within their jurisdiction. The subsections of this area are:

A) Specific Account - History information for a specific subscriber.

- ❑ Service History Only
- ❑ Alarm History Only
- ❑ All History

GETTING STARTED WEBSITE INSTRUCTIONS (Cont.)

B) All Active Accounts - View history information for all active subscribers.
   - ❑ Service History Only
   - ❑ Alarm History Only
   - ❑ All History

C) All Suspended Accounts - View history information for all suspended subscribers.
   - ❑ Service History Only
   - ❑ Alarm History Only
   - ❑ All History

3) Reports

Service information is stored and accessed here. Regulatory officials have access to this area for accounts within their jurisdiction. The subsections of this area are:

A) Add Service Report - Enter a service report for a specific subscriber account.

B) Alarm State - View list of all subscriber systems currently in alarm.

C) Systems Due for Service - View list of subscriber systems due for service in the next ninety days.

D) Expiring Contracts - View list of service contracts due to expire in the next ninety days.

SYSTEMS DUE FOR SERVICE REPORT

4) Downloads

This area is where users can download and print documents relating to the Service Pro website. The subsections of this area are:

A) Service Pro Instructions - Download the Service Pro Control Center Installation and Operation Instructions.

B) General Service Form - Download a copy of the Singulair Bio-Kinetic Wastewater Treatment System "Record of Service Performed" form.

C) Contract Renewal Form - Download the standard Singulair Service Contract.

D) Service Pro Quick Start - Download the Service Pro Quick start for detailed instructions for utilization of the Service Pro website.

5) Administration

This area is used to administer the various levels of the user groups. The subsections in this area are:

A) Distributor - Enter, edit and view distributor's contact information and Service Pro alarm notification method.
   - ❑ Edit Distributor
   - ❑ View Distributor

B) Service Provider - Enter, edit and view service provider's contact information and Service Pro emergency notification method.
   - ❑ Add New Service Provider
   - ❑ Edit Service Provider
   - ❑ View Service Provider
   - ❑ List Service Provider

C) User Internet Access - Enter, edit and view service provider and subscriber login name and passwords.
   - ❑ Service Provider Password
   - ❑ Subscriber Password

D) Invoice Statement - View subscriber invoices sorted by subscriber name.

HORIZONTAL HEADER

The horizontal header is the blue bar located below the Service Pro logo at the top of every page. The header provides hyperlinks for the most frequently used features of the Service Pro website. Click the left mouse button while the cursor is over the displayed hyperlink. The desired information will automatically be launched for the user. The hyperlinks in the horizontal header are:

A) Search - Hyperlink which goes to the List/Search Accounts page. Provides user easy access to search and sort subscriber accounts.

B) Service Due - Hyperlink which produces a list of subscriber systems due for service within the next ninety days. Results sorted by service due date.

C) Panel Info - Hyperlink which provides a brief synopsis of the Service Pro Control Center features. This information should be provided to regulatory officials, system designers and system owners.

D) Alarm State - Hyperlink which produces a list of subscriber systems currently in alarm state. Results sorted alphabetically.

E) Frequently Asked Questions (FAQ) - Hyperlink which provides a list of questions frequently asked by distributors, regulators, service providers and system owners. Click the left mouse button while the cursor

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GETTING STARTED WEBSITE INSTRUCTIONS (Cont.)

is over the desired question. The answer to the desired question will display.

F) Norweco.com - Hyperlink which goes to the Norweco home page.

SERVICE PRO HEADER, FOOTER AND ACCOUNT BOX

HORIZONTAL FOOTER

The horizontal footer is located at the bottom of every page. The footer provides hyperlinks for the most frequently used web browsing features. Click the left mouse button while the cursor is over the desired hyperlink. The desired result will automatically display. The hyperlinks in this area are:

A) Home - Hyperlink which goes to the **www.servicepromcd.com** start up page.

B) Contact Us - Hyperlink which automatically starts an email correspondence direct to Norweco. Type in your desired question and send the email. A Customer Service representative will respond promptly.

C) Help - Hyperlink which provides useful information about the Service Pro website. Click the left mouse button while the cursor is over the desired topic. A brief description about the topic is displayed.

D) Log Off - Hyperlink which formally exits the Service Pro website data fields. The login page will display.

ENTER/SWITCH ACCOUNT BOX

The Enter/Switch Account box is located on the right side of every screen. The box displays the current account number selected, subscriber name, subscriber address and Singulair system status.

ACCESSING THE SERVICE PRO WEBSITE

1. Contact Norweco customer service to request a user name and password.
2. Open your internet browser in standard fashion and in the address bar at the top of the computer screen enter "**http://www.servicepromcd.com**".
3. Press the enter key. The Service Pro login page will be displayed.
4. Type the user name provided by Norweco in the User Name field. Press the tab key.
5. Type the password provided by Norweco in the Password field. Press the enter key or click the left mouse button while the cursor is over the blue Log In box on the computer screen. The home page will be displayed.

ADD NEW SUBSCRIBER

1. Click the left mouse button while the cursor is over the blue 'add new subscriber' link. The Add New Subscriber page will be displayed.
2. Click the left mouse button while the cursor is over the black arrow located to the right of the 'Distributor/Service Provider' drop down list.
3. Click the left mouse button while the cursor is over the correct Distributor or Service Provider name.
4. Click the left mouse button while the cursor is over the blue Submit box. The Add New Subscriber detail screen will be displayed.

NOTE: All fields with a red asterisk are required and must be filled in before moving to the next screen.

5. Click the left mouse button while the cursor is over the 'First Name' field.
6. Type the first name of the new subscriber. Press the tab key and the cursor will automatically move to the 'Last Name' field.
7. Type the last name of the new subscriber. Press the tab key and the cursor will automatically move to the 'Street Address' field.
8. Type the street number and street name of the new subscriber. Press the tab key and the cursor will automatically move to the 'City' field.
9. Type the city name of the new subscriber. Press the tab key and the cursor will automatically disappear and the 'State' field will be highlighted in blue.
10. Click the left mouse button while the cursor is over the black arrow located immediately to the right of the state drop down list.
11. Move the cursor over the subscriber's state. Click the left mouse button once the correct state is highlighted. The cursor will reappear in the 'Zip / Postal Code' field.
12. Type the zip/postal code of the new subscriber. Press

GETTING STARTED WEBSITE INSTRUCTIONS (Cont.)

the tab key and the cursor will automatically disappear and the 'County' drop down list will be highlighted.

13. Click the left mouse button while the cursor is over the black arrow located immediately to the right of the county drop down list.
14. Move the on screen cursor over the subscriber's county. Click the left mouse button once the correct county is highlighted in blue. Press the tab key.
15. Check the box in front of 'System Not Remotely Monitored' for systems installed prior to the introduction of the Service Pro panel with MCD technology.
16. Click the left mouse button while the cursor is over the blue 'Next Page' box. The Mailing Address page will be displayed.
17. If the mailing address for the new subscriber is the same as the installation address, click the left mouse button while the cursor is over the 'Same as Above' box. Proceed to step 23.
18. If the mailing address for the new subscriber is different than the installation address, click the left mouse button while the cursor is over 'Street Address' field.
19. Type the street number and street name of the new subscriber's mailing address. Press the tab key and the cursor will automatically move to the 'City' field.
20. Type the new subscriber's mailing address. Press the tab key and the cursor will automatically disappear and the 'State' field will be highlighted in blue.
21. Click the left mouse button while the cursor is over the black arrow located immediately to the right of the state drop down list.
22. Move the cursor over the subscriber's state. Click the left mouse button once the correct state is highlighted in blue. Press the tab key and the cursor will reappear in the 'Zip / Postal Code' field.
23. Type the zip / postal code of the new subscriber. Press the tab key and the cursor will automatically move to the 'Home Phone' field.
24. Type the home phone number for the new subscriber. Type numbers only, not periods, dashes, or parenthesis. Press the tab key and the cursor will automatically move to the 'Mobile Phone' field.
25. The mobile phone filed is an optional field where an entry is not required to move on. If you choose, type the mobile phone number for the new subscriber. Type numbers only, no periods, dashes, or parenthesis. Press the tab key and the cursor will disappear and the 'Time Zone' field will be highlighted in blue.
26. Click the left mouse button while the cursor is over the black arrow located immediately to the right of the time zone drop down list.
27. Move the cursor over the new subscriber's time zone. Click the left mouse button once the correct time zone is highlighted in blue. Press the tab key and the cursor will automatically reappear in the 'Email Address' field.
28. The email address is an optional field where entry is not required. If you choose, type the email address for the new subscriber. Press the tab key and the cursor will move to the 'Aerator Serial Number' field.
29. Type the serial number of the aerator installed in the new subscriber's Singulair system. Press the tab key and the cursor will automatically move to the 'Control Serial Number' field.
30. Type the serial number for the Service Pro control center installed in the new subscriber's Singulair system.
31. The next three screens contain optional data fields for location, Singulair system, accessories and permit information. Fill in the fields as necessary.
32. Click the left mouse button while the cursor is over the blue Next Page box on the computer screen until you reach the Service Contract page.
33. Enter the necessary information for the new subscribers's service contract. Once complete, click the left mouse button while the on screen cursor is over the blue Submit box.
34. Adding the new subscriber is complete and remote monitoring will begin.

DOCUMENTATION

Prior to start up of the Service Pro monitoring system, each new subscriber executes a monitoring service agreement. Once the agreement is signed by the subscriber and distributor of record it is sent to Norweco. This agreement must be received within thirty days. The remote monitoring service will begin immediately after completion of the Add New Subscriber steps detailed in this document. New subscribers sign a 24 month monitoring service agreement. Subscribers have the option to choose from 12 month, 24 month, 36 month, or 48 month renewal agreements. Contracts do not automatically renew.

The distributor of record will be invoiced for each new monitoring agreement the month following the date the agreement is executed. The invoice amount will cover the entire term of the monitoring agreement. As an example, a distributor who initiates a 24 month contract will pay for the entire 24 months. Initial and renewal Singulair service contracts should include the cost to provide the Service Pro monitoring system.

ADD SERVICE PRO TO WEB BROWSER FAVORITES

The Service Pro website will become an integral part of the distributor's daily activities. The home page should be book marked in all internet browser programs to facilitate easy access. The distributor shall ensure the Service Pro website is book marked by all regulatory officials, system designers and system owners. Consult the browser help feature on how to book mark the Service Pro website.

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BIO-KINETIC® WASTEWATER TREATMENT SYSTEM

SERVICE PROGRAM AND RECORDKEEPING

Complete and detailed installation and service records must be kept on each Singulair 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 Singulair customers.

INITIAL ORDER RECORDS

When a Singulair order is received, record the following information on your delivery slip: customer's name, address and telephone number, equipment ordered (including system model number and optional equipment such as 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 the proper quantity of Norweco aerators from your stock. Open each aerator shipping carton at the top and remove the Singulair control center. Attached to the control center is a copy of the three-part warranty registration card, an Owner's Manual and a red warning tag. Make sure that the model number and serial number on the outside of each aerator shipping carton matches the aerator nameplate and all three sections of the registration card. Give all control centers with attached literature to the tank delivery driver.

Remove the vent cap assembly from each aerator shipping carton and place it into your revolving stock. Do not remove the aerator or aspirator shaft from the shipping carton. Close each aerator carton and identify it on the outside with the name and address of your customer so that matching aerator and control centers will be installed. All aerators will remain in your plant until the customer requests installation and start-up.

Select the proper quantity of Bio-Kinetic systems and optional equipment from your stock. Make sure the model number for each Bio-Kinetic system matches the customer order. Identify the outside of each Bio-Kinetic system shipping carton with the customer's name and address.

TANK INSTALLATION RECORDS

When the Singulair tank and controls are installed, the contractor or owner should sign an itemized delivery slip. Your driver should tear off the bottom portion of the three part card attached to each control center. 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 Singulair Owner's Manual.

RECORDS OF SYSTEM START-UP

When aerator and Bio-Kinetic system 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 aerator installation and start-up should be filled in and these cards returned to the office when each aerator and Bio-Kinetic system has been installed.

SINGULAIR CUSTOMER MASTER FILE

When system start-up is complete, transfer the owner's name, address, telephone number, system model number, serial number for each aerator 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 Singulair master file. The file should contain one card for each Singulair installation. It must be updated whenever an exchange aerator is installed or system ownership changes.

SINGULAIR SERVICE FILE

File each original service and warranty record card in the Singulair service file. The service file should be set up on the first month you begin to install and start-up Singulair systems. Make a divider tab which has visible the number "1" on it. File the service and warranty record card for each

SERVICE PROGRAM AND RECORDKEEPING (Cont.)

system placed into operation this month ahead of this divider "1" tab. On the first day of the 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 SINGULAIR SERVICE INSPECTIONS

Four semi-annual service inspections are to be completed after the system has been installed. They are scheduled after six, twelve, eighteen and twenty-four months. To determine which systems are due inspections each month, update the Singulair service file with a new month divider on the first day of the month and remove all cards from behind divider tabs 6, 12, 18, and 24. Fill out one three-part service inspection record card for each system with system model number, all aerator model and serial numbers, county, owner's name, address and directions to the site. Be sure this information is duplicated on all three sections of the 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 owner has not returned a service contract, check the box on all three portions of the card indicating that the service policy 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 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 service inspection.

EMERGENCY SERVICE CALLS

Occasionally you may be asked to service a Singulair system in advance of its next prescheduled inspection. When the service request 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 Singulair service is in effect for the first twenty-four months of system operation. After that time the owner is invited to continue service 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. Follow-up each

MAIL SERVICE POLICIES AT 22 AND 23 MONTHS

mailing to owners who have not responded to your 22nd month notice by remailing 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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SINGULAIR® BIO-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 four 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 6, 12, 18 and 24 and from behind tabs which are multiples of six: 30, 36, 42, 48, 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 Singulair 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 EXCHANGE AERATORS

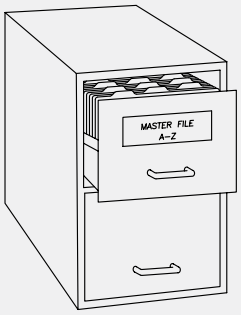
When an owner uses the fifty year exchange program to receive a new aerator, the two year limited warranty begins again. However, the two year initial service program does not. No service is performed unless a service contract is in effect. When the exchange aerator is installed, a new warranty registration is included. The top portion, containing the new aerator serial number is to be kept with the Owner's Manual. The middle portion must be signed by the owner and returned to the factory. The lower portion is filed behind the original card in the Singulair customer master file or service file, whichever is appropriate. Note on the new card the aerator installation date and also mark the card that the six, twelve, eighteen and twenty-four month inspections will not apply. Record the exchange unit serial number and installation date on the 4 x 6 card in the alphabetical master file. It is important that service and warranty record cards be retained for installations with exchange aerators because future determinations of aerator age will be based upon the original system start-up date.

INACTIVE SINGULAIR 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 Singulair 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.

THREE SIMPLE FILES PROVIDE AUTOMATIC SERVICE SCHEDULING

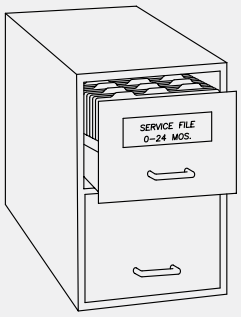
Detailed and accurate record keeping guarantees efficient service performance, reduced man-hours and increased profits.



MASTER FILE

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

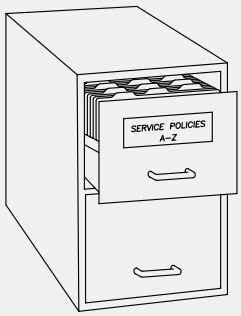
- Lists owner's name, address and telephone number
- Lists system installation date, model number and serial number
- Is updated when ownership changes
- Is updated when an exchange aerator is installed
- Is followed by service and warranty record card and all service inspection cards for inactive installations



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 Singulair installation filed:

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

PROGRESS THROUGH norweco **SERVICE SINCE 1906**

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BIO-KINETIC® WASTEWATER TREATMENT SYSTEM

SINGULAIR® SYSTEM AND CONTROL CENTER SERVICE

To maximize owner protection, the Singulair Bio-Kinetic wastewater treatment system is backed by a two year limited warranty on system components and a fifty year aerator exchange program. The initial selling price includes a series of four prescheduled service inspections at six month intervals which cover the first two years of system operation. These inspections should completely familiarize the owner with the Singulair Bio-Kinetic wastewater treatment system and answer any questions that arise. Carefully check all component parts of the Singulair 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 Singulair system you have installed.

While making service inspections during the two year warranty 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 Singulair system service work are contained in the Singulair field service cart and Tool Kaddy. You will also need exchange Bio-Kinetic systems, a supply of Blue Crystal disinfecting tablets and a supply of Bio-Neutralizer dechlorination tablets. Bio-Kinetic systems may be supplied with or without Blue Crystal and Bio-Neutralizer chemical feed systems. Therefore, check your Distributor Service and Warranty Record Card carefully to be sure you have selected exchange Bio-Kinetic systems with correct flow distribution decks.

SINGULAIR 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 Singulair aerator, control center and Bio-Kinetic system.
- 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 aerator life and minimal power consumption costs due to regular, qualified service visits.

These instructions are designed to cover the important points of Singulair Bio-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 Singulair Trouble-Shooting 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 Singulair control center and 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 Singulair 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 Singulair system is turned on.
2. Check the three-position selector switch in the Singulair control center to make sure it is set to "automatic" operation.
3. See that your company's identification label is affixed to the Singulair control center and is legible. Replace the label if necessary.
4. Make sure that the aerator model number and serial number tag is attached to the control center 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 aerator, as far as it is visible, and notify the owner if you see any damaged areas.
7. As you leave, make sure the Singulair control center is set for "automatic" operation. Secure the Singulair control center with a new tamper evident seal.
8. Make appropriate notations on the condition of the electrical control center on the Service Inspection Record Card.

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INTEGRATED SYSTEM CONTROLS

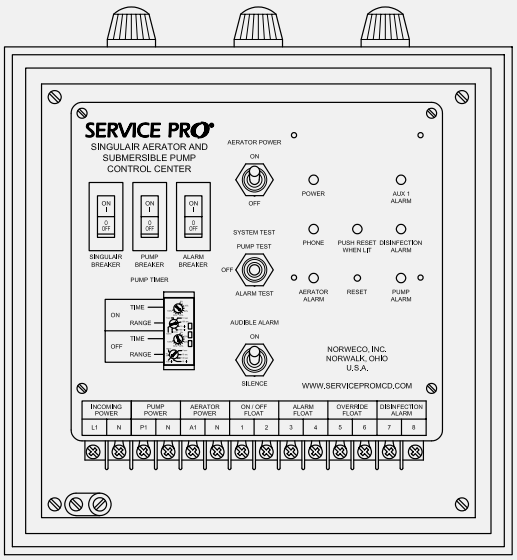
SINGULAIR® SYSTEM AND CONTROL CENTER SERVICE

The integrated system controls are designed to accommodate installations where a Singulair wastewater treatment system is used in conjunction with an effluent disposal systems that requires pumping. Integrated system controls allow both the Singulair aerator and the pump used in the associated effluent disposal system to be controlled from a single panel. These control systems are backed by the same two year limited warranty that is associated with the Singulair wastewater treatment system.

These instructions are directed to the specific requirements of servicing integrated system controls. They are not intended to cover all aspects of service for the Singulair System. Additional instructions are contained in Bio-Kinetic wastewater treatment system Singulair system and control center service.

CONTROL CENTER SERVICE

CAUTION: If your visual inspection of the Singulair 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 prior to proceeding.



INTEGRATED SYSTEM CONTROLLER

While the power to the panel is off check the treminal strip screws to insure that they are tight and securly connecting the wires at each connection. Also check to the connection to the grounding lug to insure the ground wire is securely fastened to the grounding lug. Loose connections can result in system malfuction.

Control center service should be performed during each service inspection and should follow all parameters outlined in the Singulair Service Manual.

NOTE: The performance of the Singulair system has been tested and certified with the aerator(s) operating on a minimum cycle of 30 minutes per hour. No adjustment should be made to the factory preset time clock setting without following the detailed steps outlined in the “Time Clock Setting and Service Instructions”.

1. If there is no evidence of an electrical problem, check the main service panel to see that the circuit breaker is in the “on” position.
2. Check to see that all circuit breakers within the integrated control center are in the “on” position.
3. Check to see if the aerator breaker is in the “on” position by pressing on the pop out indicator. If this breaker is tripped it will snap back into the run position.
4. Check the aerator selector switch in the Singulair integrated system controls to make sure that it is set to “automatic” operation.
5. Activate the alarm test switchto insure the audible and visual alarms are functioning properly. While the audible alarm is sounding test the alarm silence switch to verify proper operation.
6. Return the alarm test switch to the “off” position and the audible alarm switch to the “on” position after it has been determined that the alarm features are properly functioning.
7. Verify that your company’s identification label is affixed to the Singulair system controls and is legible. Replace the label if necessary.
7. Inspect wiring from the control center to the aerator(s) and pump(s) as far as it is visible, and notify the owner if you see any damaged areas.
8. Check the functionality of the pump by usingthe pump test switch. If the pump fails to activate see the aerator troubleshooting section of this document.
8. As you leave, make sure that the Singulair integrated system controls are set for “automatic” operation for all aerators and pumps.
9. Make appropriate notations on the electrical control center conditionon the service inspection record card.

SINGULAIR® SYSTEM AND CONTROL CENTER SERVICE (Cont.)

AERATOR TROUBLESHOOTING

ELECTRICAL TROUBLESHOOTING

CAUTION: Before initiating any electrical component inspection or repair, turn off all power to the Singulair system by switching off the dedicated circuit breaker in the main electrical service panel and then test with the electrical multi-meter. Repairs should always be made by a qualified electrician using proper procedures and safe tools. Make sure that all circuits are properly grounded. Do not stand in damp locations when making electrical system tests. Always use tools with insulated handles for electrical repairs.

NO ELECTRICAL POWER FROM ELECTRICAL SERVICE PANEL TO CONTROL CENTER

Integrated system controls terminal L1 and N read zero voltage	Follow instructions detailed in "Electrical Troubleshooting" section of Singulair Service Manual

NO ELECTRICAL POWER FROM CONTROL CENTER TO AERATOR

Integrated system controls terminal A1 and N read zero voltage	Follow instructions detailed in "Electrical Troubleshooting" section of Singulair Service Manual

NO ELECTRICAL POWER FROM CONTROL CENTER TO PUMP

Integrated system controls terminal P1 and N read zero voltage	Check to see that pump circuit breaker is in the "on" position
Pump selector switch in "automatic" position, but pump does not run	Check to see that "on" float in pump station wet well is elevated to its "closed" position
Pump selector switch in "hand" position, but pump does not run	Check all wiring from control center to pump

AERATOR WILL NOT START

Aerator selector switch in "hand" position, but aerator does not run	Follow instructions detailed in "Electrical Troubleshooting" section of Singulair Service Manual

PUMP WILL NOT START

Proper voltage at terminals P1 and N, but pump does not run	See instructions contained in Pump Operation and Maintenance Manual
Pump does not run when proper float inverted	Replace defective float

AERATOR DRAWING EXCESSIVE CURRENT

Foam restrictor partially under water	See Singulair System Flooded
Debris on aspirator shaft	Remove debris with knife
Motor failure	Return aerator to factory
Insufficient voltage (less than 103 volts)	Report condition to power company
Excessive voltage (greater than 126 volts)	Report condition to power company

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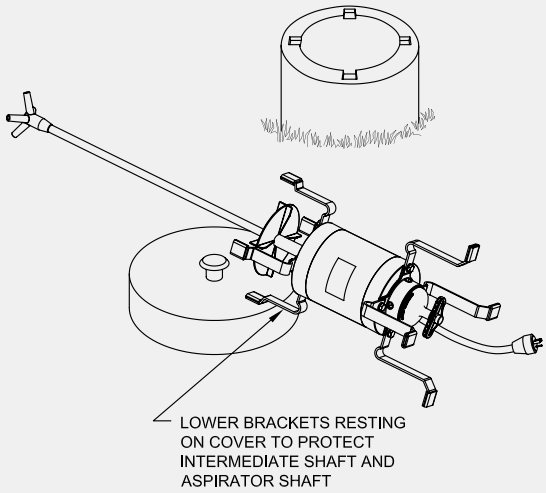
BIO-KINETIC® WASTEWATER TREATMENT SYSTEM

SINGULAIR® AERATOR SERVICE

The Singulair aerator has been specifically designed for use in the Singulair system and is the only electro-mechanical component. It provides maximum air introduction, thorough mixing and assures reliable, economical wastewater treatment. For Singulair systems requiring more than one aerator, follow these instructions for each aerator and aeration chamber. The Singulair aerator is factory lubricated for the life of the unit. No service inside the aerator is required. Unauthorized disassembly will void the warranty.

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

1. Open the control center and place the aerator on the "continuous" run cycle.
2. As you approach the Singulair tank, listen for excessive noise before removing the vented cover.
3. Remove the vented access cover located above the aeration chamber and place it aside. The aerator should be operating normally.
4. Make sure the debris screens are in place in the air intake ports. Manually check the aerator brackets for excessive vibration.
5. 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.
6. Carefully remove the debris screens from the air intake ports. Wipe the aerator air intake ports with a damp cloth being careful not to allow dirt or debris to enter the intake openings.
7. Using the Singulair flowmeter, check the air delivery. It should read approximately 3 CFM. Refer to the Singulair Aerator Flowmeter Instruction Sheet for complete details.
8. 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.
9. Within 2-3 minutes after turning off the aerator, perform a settleable solids test of the aeration chamber contents. Refer to Singulair Tank Pumping Instructions for details.
10. Remove the aerator from the mounting casting. BE CAREFUL when removing the aerator to see that the aspirator shaft does not come in contact with the mounting casting. The aspirator shaft is straightened to a critical tolerance before it is shipped from the factory. It must retain this straightness tolerance or vibration may result. Excessive vibration can greatly shorten aerator life and could also cause the unit to consume more electrical power than necessary.
11. Check the rubber shock absorbers on each bracket for wear. Replace any that are missing or worn.
12. Check the power cord from the moisture resistant electrical connector to the aerator. Be sure it is free of nicks or worn spots.
13. Lay the aerator on its side against the aerator mounting casting or vented cover. Check to see if there is a water mark on the outside of the aerator and notify the owner if one is found. The aerator is flood proof and mechanically designed so that it can return to normal operation unharmed after being subjected to intermittent high water. However, a high water mark on the outside of the aerator does indicate there is a problem in the effluent disposal line, disposal field or elsewhere in the installation. If the problem is left uncorrected, wastewater could back up into the tank, void the aerator warranty and eventually flood the facility.



PLACE AERATOR AGAINST COVER

SINGULAIR® AERATOR SERVICE (Cont.)

14. Carefully loosen the two stainless steel set screws on the bottom of the intermediate shaft and remove the aspirator shaft. Remove any internal deposits from the four aspirator orifices with the aspirator shaft cleaning tool. Connect the aspirator shaft to the shaft cleaning hose and outside water faucet to flush the inside of the aspirator shaft clean. Use full water pressure. Remove the shaft from the cleaning hose and inspect the bore to see that it is clean.
15. Push the stainless steel brush with extension handle through the stainless steel intermediate shaft and hollow motor shaft to dislodge any residue that may have accumulated. **NOTE:** Do not flush the motor shaft with water. Remove any debris from the air intake openings.
16. Thoroughly clean both the bottom and the top surfaces of the foam restrictor.
17. Reinstall the aspirator shaft into the intermediate shaft. Match the permanent alignment marks on the aspirator and intermediate shafts to maintain the original factory balance. Tighten the set screws with a tee-handle allen wrench, finger tight only. Too much pressure may dish the side of the aspirator shaft and compromise the straightness tolerance.
18. 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. Refer to Singulair Tank Pumping Instructions for details.
19. 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 Singulair Tank Pumping Instructions for details.
20. Inspect the underground power cable in the aerator mounting casting for breaks or scars in the insulation. Examine the inside of the mounting casting and riser for evidence of ground water entry.
21. Carefully reinstall the aerator in the mounting casting. Do not allow the aspirator shaft to touch the mounting casting side walls. Make sure the weight of the aerator is evenly distributed on the upper end of all four mounting brackets.
22. Using a multi-meter, check the voltage at the electrical connector. The meter should read 115 volts ± 5% for systems equipped with electro-mechanical control centers and zero volts for systems with Service Pro controls. Record the voltage on the Service Inspection Card.
23. Wipe the aerator 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 aerator. The aerator should not draw more than 3.8 amps. Record the amperage on the Service Inspection Card. **NOTE:** When the aerator is started for the first time, the break-in period may cause the amp draw to be as high as 4.2 amps for the first 48 hours of operation.
24. Clean or replace the four air intake debris screens. Make sure one screen is placed in each intake opening to prevent debris from entering the aerator.
25. Inspect the vent cap in the aerator access cover and clear the fresh air openings of any debris to insure unrestricted passage of air. Reinstall the access cover on the mounting casting.
26. Make the appropriate notations regarding the aerator, the results of the settleable solids test and related items on the Service Inspection Record Card.
27. Proceed with clarification chamber service as outlined in Routine Service Inspections-Clarification Chamber with Bio-Kinetic System. When the all routine service is complete, return to the control center and restore the Singulair system to the proper operating time cycle for this installation. Close the control center cover and secure it with a new tamper evident seal.

IF AN AERATOR MUST BE REMOVED

The service technician should be able to restore most installations to full operation during the initial service call. If the aerator is no longer eligible for the two-year limited warranty, the aerator should be removed and replaced with a remanufactured and fully warranted exchange unit from your rotating stock. This will become the permanent aerator in service at the facility and your company's service records should be updated to reflect the new aerator serial number. If the serial number portion of the Warranty Registration Card is still attached to the control center, be sure to fill in the new serial number for the owner. When you have accumulated several aerators requiring factory service, return them to Norweco. This reduces administrative time and the cost of shipment per unit. When remanufactured aerators are returned to you, add them to your rotating stock. In this way, the installation is restored to full service with a fully warranted unit in only one service trip.

EXCHANGE AERATOR COSTS

You may compute exact costs for exchange aerators during your service inspection since the cost is determined by system age, regardless of condition. Exchange rates are given on the Singulair Warranty and Exchange Program data sheet. In cases where the aerator has failed under warranty, you should replace it with a loaner unit to insure continued operation of the system and protect effluent quality. Return the warranted unit to the factory immediately for replacement and schedule reinstallation with the owner at the earliest possible convenience when it is returned to you.

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BIO-KINETIC® WASTEWATER TREATMENT SYSTEM

USING THE UNIVERSAL TOOL

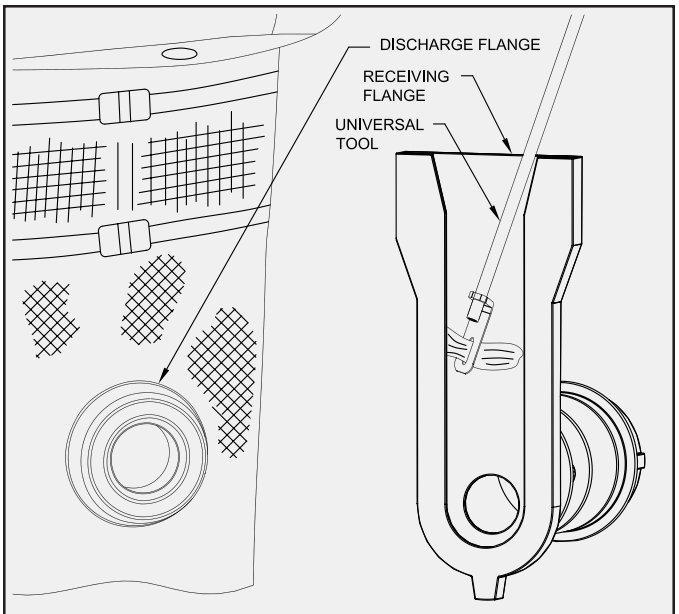
The universal tool is available to assist in the installation and service of the Bio-Kinetic system. This device incorporates a swab tool, locking lug tool, lifting tool and disassembly tool into one convenient package. The swab tool simplifies the application of Bio-Kinetic lubricant to the outlet components of the Singulair tank. The locking lug tool engages and disengages the locking lugs of the Bio-Kinetic system beneath the concrete lip of the mounting casting. The lifting tool assists in the installation and removal of the Bio-Kinetic system from the Singulair tank. The disassembly tool allows the inner components of the Bio-Kinetic system to be removed and reinstalled without removing the entire assembly.

USING THE SWAB TOOL

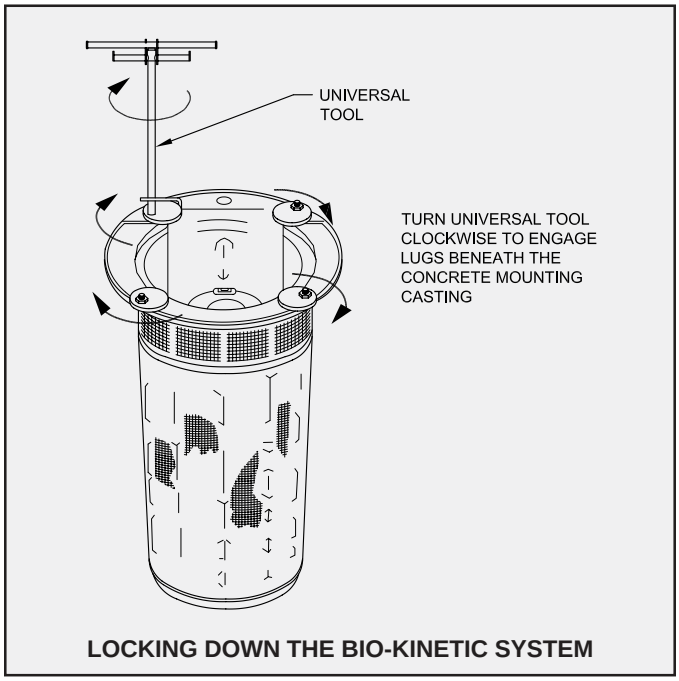
The swab tool is used to apply Bio-Kinetic lubricant to the rubber and plastic outlet connection components. Proper lubrication will insure the outlet connection engages easily without leaks. To prepare the swab tool for use, place a clean cloth through the eyelet of the swab tool and apply Bio-Kinetic lubricant to the cloth.

Examine the receiving flange cast into the outlet of the Singulair tank. The grooves and face of the receiving flange should be free from debris. Using the swab tool, apply a liberal amount of Bio-Kinetic lubricant to the grooves and face of the receiving flange. Locate the gasketed discharge flange assembly installed in the outlet of the Bio-Kinetic system. Remove any debris from the gasket with a clean cloth. Lubricate the gasket using the swab tool.

CAUTION: Bio-Kinetic lubricant has been specially formulated. Use of other lubricants, especially petroleum based lubricants, can cause degradation of the rubber components and will void the warranty.



LUBRICATING THE OUTLET COMPONENTS



LOCKING DOWN THE BIO-KINETIC SYSTEM

USING THE LOCKING LUG TOOL

The locking lug tool engages and disengages the locking lugs beneath the concrete lip of the mounting casting. When locked into position, the locking lugs hold the Bio-Kinetic system in place. The locking lugs must be disengaged to allow the Bio-Kinetic system to be removed from the Singulair tank for service.

To engage or disengage the locking lugs, remove the clarification chamber access cover and place it upside down next to the mounting casting. Remove the service cover from the Bio-Kinetic system. Place the locking lug tool, located opposite the fixed handle, over one of the locking lug bolts of the Bio-Kinetic system. Turn the locking lug tool clockwise to engage or disengage lugs beneath the concrete lip of the mounting casting.

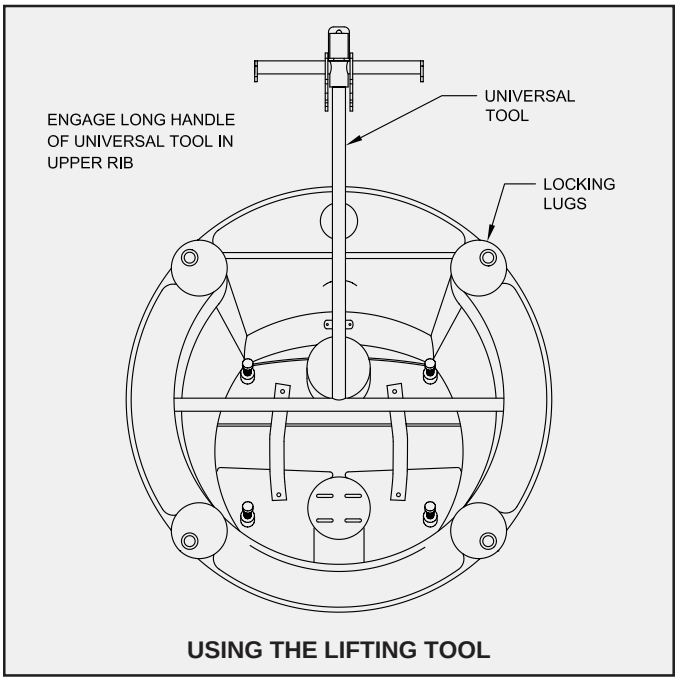
USING THE UNIVERSAL TOOL (Cont.)

USING THE LIFTING TOOL

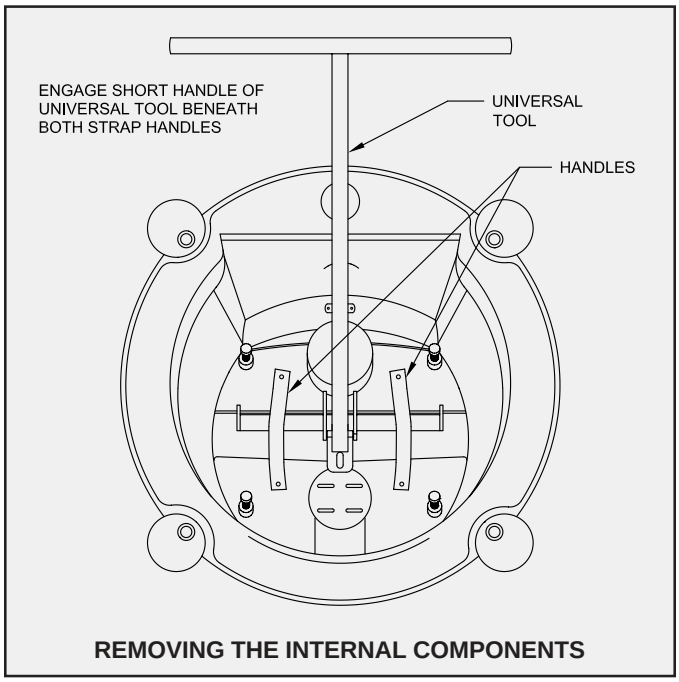
The lifting tool assists in the installation and removal of the Bio-Kinetic system from the Singulair tank. The Bio-Kinetic system will need to be removed from the clarification chamber periodically for cleaning and service.

To remove the Bio-Kinetic system, remove the clarification chamber access cover and place it upside down on the ground near the mounting casting. Remove the service cover from the Bio-Kinetic system. Follow the instructions on the previous page to disengage the locking lugs.

The universal tool is equipped with a fixed handle and a movable handle. Lower the fixed handle into the open top of the Bio-Kinetic system. The fixed handle of the lifting tool should be aligned with two opposing locking lugs to allow the tool to drop into the lifting rib on the Bio-Kinetic system. Insert the end of the fixed handle that is opposite the flat area on the Bio-Kinetic system into the lifting rib. Lower the other end of the fixed handle down by the side of the flat area and into the lifting rib. Turn the handle until the lifting tool is engaged into the lifting rib. Guide the Bio-Kinetic system out of the mounting casting as it is being dewatered. Once completely dewatered, remove the Bio-Kinetic system from the mounting casting.



USING THE LIFTING TOOL



REMOVING THE INTERNAL COMPONENTS

USING THE DISASSEMBLY TOOL

The disassembly tool allows the deck plates, flow deck, and inner baffle of the Bio-Kinetic system to be removed for service without removing the entire system from the clarification chamber. It is not necessary to dewater the Bio-Kinetic system before removing the internal components.

To remove the internal components, remove the Bio-Kinetic system access cover and place it upside down on the ground near the mounting casting. Remove the service cover from the Bio-Kinetic system. Do not disengage the locking lugs.

The universal tool is equipped with a fixed handle and a movable handle. Lower the movable handle into the open top of the Bio-Kinetic system. The movable handle of the disassembly tool should be positioned so that each end of the movable handle is beneath the plastic handles on top of the flow deck. Lift the internal components with the disassembly tool to remove them from the Bio-Kinetic system. When service has been completed, use the disassembly tool to lower the internal components back into the Bio-Kinetic system.

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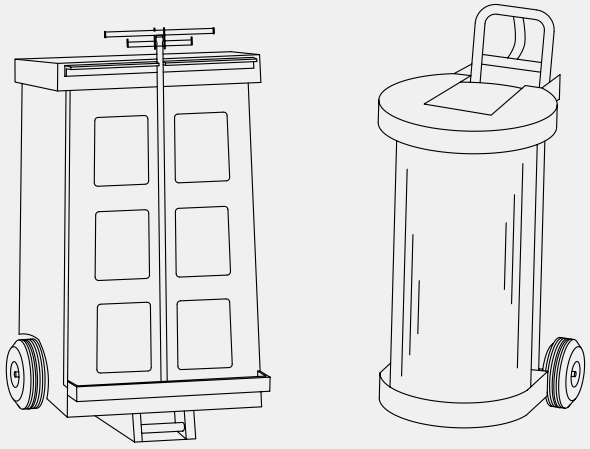
BIO-KINETIC® WASTEWATER TREATMENT SYSTEM

CLARIFICATION CHAMBER AND BIO-KINETIC® SERVICE

Check operation of the Singulair control center and complete all Singulair Aerator Service instructions to the point of aerator reinstallation before proceeding with clarification chamber service. Do not reinstall the aerator in the mounting casting until all Bio-Kinetic systems have been removed from the Singulair tank. For Singulair systems requiring more than one Bio-Kinetic tertiary treatment device, follow these instructions for each Bio-Kinetic system installed.

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

1. Move the Singulair field service cart with exchange Bio-Kinetic system and Tool Kaddy near the clarification chamber access cover. Remove the service container from the field service cart, unscrew the wing nuts holding the service container cover and set them aside. Remove the service container cover and place it upside down along side the clarification chamber access riser. Remove the exchange Bio-Kinetic system from the service container and set it aside. Remove the universal tool from the front of the tool kaddy and open the doors.



TOOL KADDY AND SERVICE CART

2. Lift off the concrete clarification chamber access cover(s) and turn it (them) upside down near the access riser. Remove the Bio-Kinetic system service cover and check the condition of the Bio-Kinetic system and the liquids in the tank for color and odor. Note the condition of the system on the service inspection record card.

   NOTE: Attached to the Bio-Kinetic system service cover is a red tag listing the Singulair system model number, classification and daily treatment capacity. This service cover and tag must remain with the installation and be reinstalled after exchanging the Bio-Kinetic system.

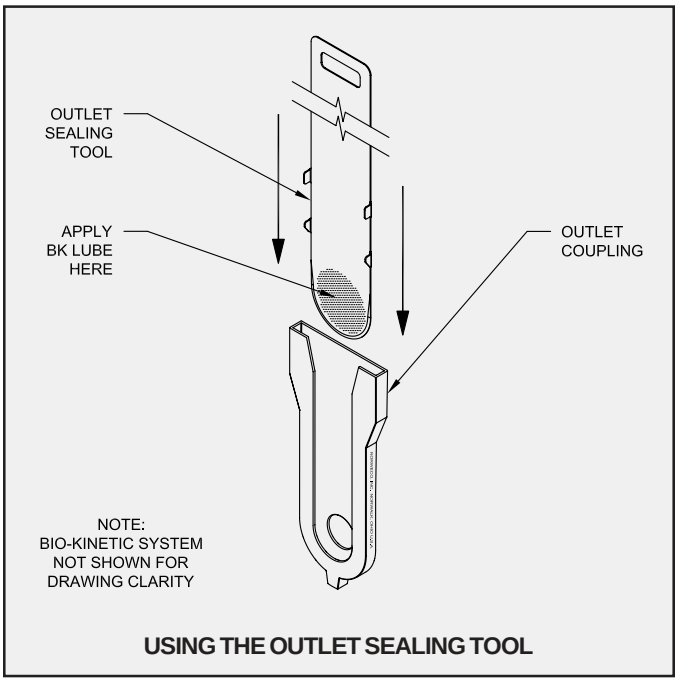
3. To prevent loss of liquid from the Singulair system during service, use the Bio-Kinetic System Outlet Sealing tool. Thoroughly lubricate both sides of the tool below the tabs to the rounded end with BK lube. With the tabs facing toward the Bio-Kinetic system, insert the tool in between the Bio-Kinetic outlet flange and the cast-in-place receiving flange of the Singulair tank. Completely insert the tool to the bottom of the outlet coupling.

4. Using the disassembly tool, remove the internal components from the Bio-Kinetic system. The internal components should be set aside while the remainder of the Bio-Kinetic system is removed.

5. The Bio-Kinetic system is equipped with a drain valve and a fill valve to allow for easy removal and reinstallation during service. The locking lugs must be disengaged to allow for removal. Using the locking lug tool, rotate each of the four round black locking lugs clockwise from beneath the access riser. Insert the universal tool lifting handle into the upper lip of the Bio-Kinetic system outer chamber bucket.
6. While standing over the riser, begin lifting the system from the tank. The self drain valve will automatically open as the system is lifted out of the riser. Continue lifting until the majority of the water has drained out of the system. Remove the Bio-Kinetic system from the mounting casting. Set the Bio-Kinetic system on the upside down lid of the service container

7. Record the color and condition of the Bio-Kinetic system on the Service Inspection Record Card and on the “Supplementary Service” section of the Owner’s Manual. Make appropriate notations on the condition

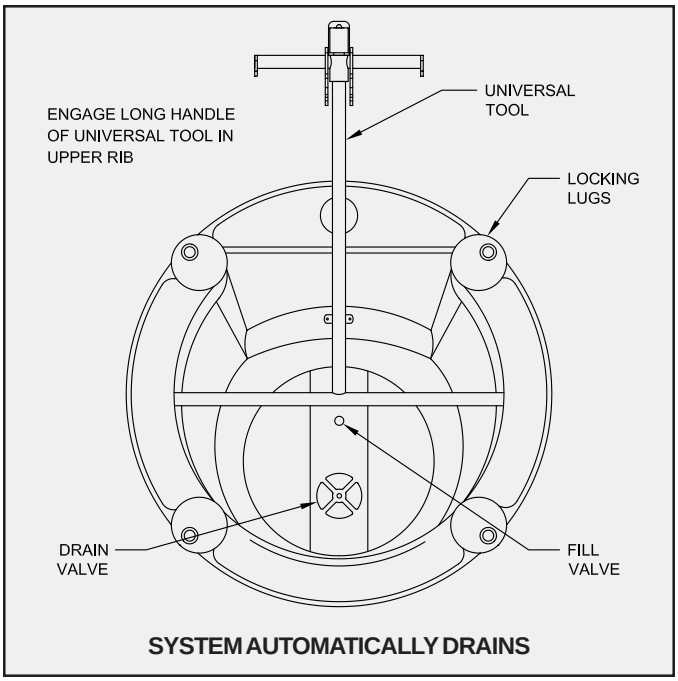
CLARIFICATION AND BIO-KINETIC® SERVICE (Page 2 of 5)



USING THE OUTLET SEALING TOOL

of the clarification chamber. Also note the liquid level on the filter media. The peak flow filter media should be clean in appearance if the hydraulic loading has never been great enough to cause the liquid level in the clarification chamber to rise above the design flow filter media. If a temporary hydraulic surge has occurred, a dark line will be visible on the peak flow filter media. Note the system water level on the Service Inspection Record Card.

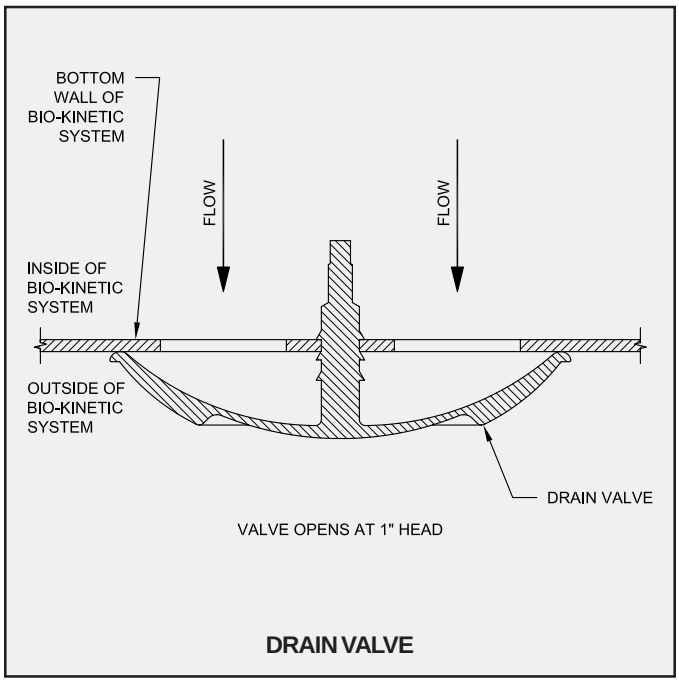
8. Unscrew the discharge flange assembly and remove both pieces. It may be necessary to hold the inside threaded flange to unscrew the two pieces. After both pieces of the discharge flange are removed, place the internal components back into the Bio-Kinetic system.



SYSTEM AUTOMATICALLY DRAINS

9. Place the Bio-Kinetic system into the service container. The outlet of the Bio-Kinetic system must align with the flat panel in the container. Thread the discharge flange assembly together and place it on the flow deck. Now put the service container cover in place.

10. Reinstall the Singulair aerator as outlined in the Aerator Installation instructions. The aerator must be in operation while the remaining clarification chamber service is performed.



DRAIN VALVE

11. 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 aerator running, use the hopper scraping tool to gently scrape all areas of the clarification chamber hopper side walls. Scrape all the way down to the bottom of the chamber, below the discharge of the Bio-Static sludge return. Then scrape the small flat area at the bottom of the hopper, pushing toward the aeration chamber as far as possible.

12. If the Singulair tank is pumped during system service the pressure sensitive fill valve will fill the Bio-Kinetic system automatically as the tank refills.

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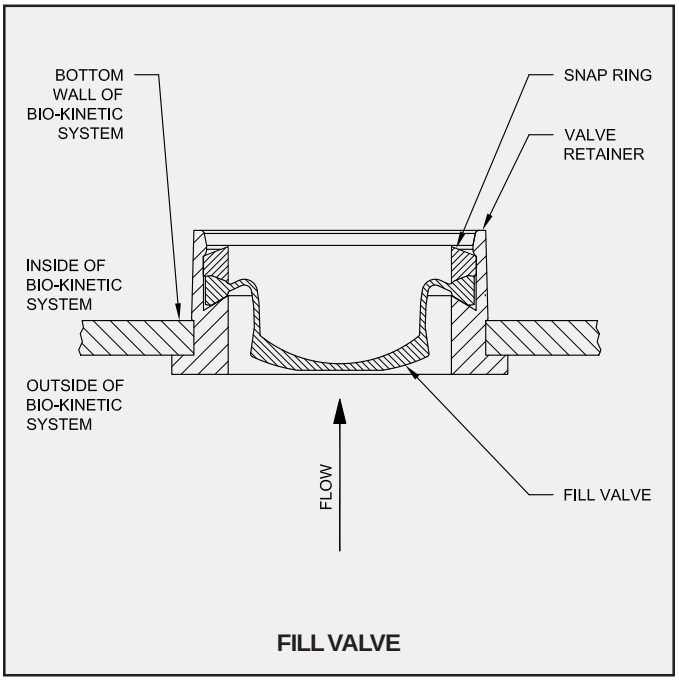
WASTEWATER TREATMENT SYSTEM

CLARIFICATION AND BIO-KINETIC® SERVICE (Page 3 of 5)

NOTE: It is important that the clarification chamber side walls be cleaned only after the aerator has been serviced and reinstalled. The aerator must be operating so that settled sludge will be fully returned to the aeration chamber by the hydraulic currents flowing through the Bio-Static sludge return.

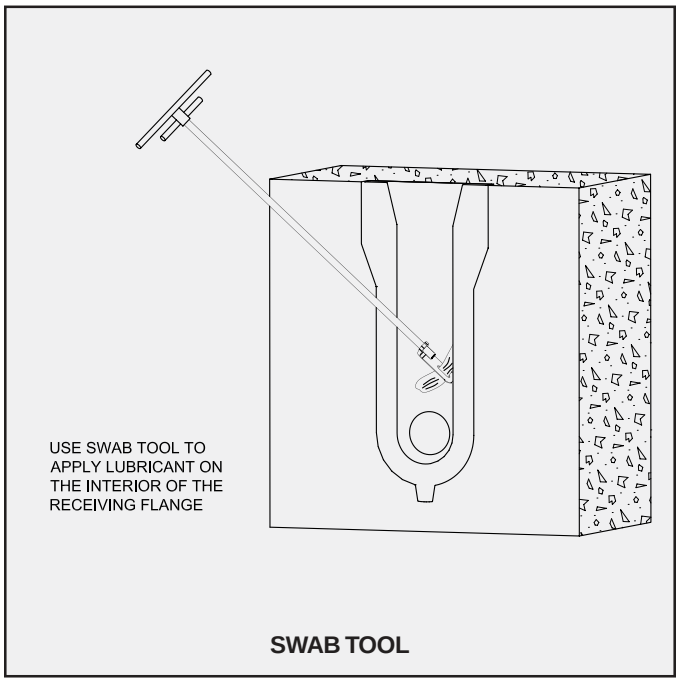
13. Visually check each Bio-Static sludge return to insure that it is securely engaged in the aeration/clarification chamber wall.



FILL VALVE

14. If necessary, use water to wash away any sludge from the inside of the system mounting casting, grade riser, cover and surrounding grass or landscaping.

15. Note the liquid level in the clarification chamber. If the liquid level is above the flow line of the outlet coupling, consult the trouble-shooting guide to determine if there is a problem with drainage. Improper drainage will lead to flooding of the Singulair Bio-Kinetic wastewater treatment system and must be reported to the owner. Examine the inside of the access riser for evidence of surface water entry.
16. Examine the condition of the Singulair tank outlet coupling and cast-in receiving flange. Any debris that has accumulated in the grooves of the receiving flange or the inside of the tank outlet coupling must be removed. Wipe the face of the receiving flange and the internal surface of the grooves clean. Using the swab tool, apply a liberal amount of Bio-Kinetic lubricant to the entire face of the receiving flange and the inside of the grooves. Apply the lubricant evenly until all interior surfaces of the receiving flange and grooves are thoroughly coated.

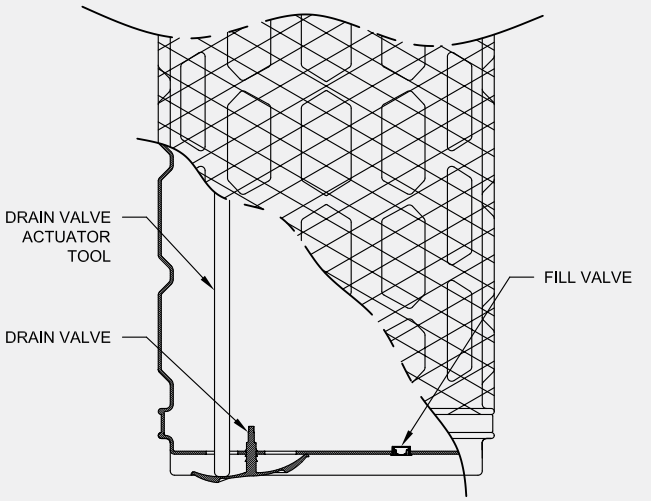


SWAB TOOL

CAUTION: Bio-Kinetic lubricant has been specially formulated. Use of other lubricants, especially petroleum based lubricants, can cause degradation of the rubber components and will void the warranty.

17. Remove the discharge flange assembly and internal components from the exchange Bio-Kinetic system. Lubricate the grommet in the outlet opening. From the inside of the contact chamber, insert the male threaded flange through the grommet. Reinstall the gasketed discharge flange on the Bio-Kinetic system by turning it clockwise until tight. Reinstall the flow deck and internal components. Apply lubricant to the exterior surfaces of the gasketed discharge flange.
18. Remove the internal components from the replacement Bio-Kinetic system and set aside. Use the universal tool to lower the exchange Bio-Kinetic system outer chamber into the mounting casting. Carefully insert the tip of the drain valve actuating tool through the drain valve located in the bottom of the outer chamber of the Bio-Kinetic system. This will allow the Bio-Kinetic system to fill with water as it is lowered into position. If allowed to tilt, the Bio-Kinetic system could rub the edge of the access opening and damage the filter media. Align the discharge flange with the cast in place receiving flange. As the chamber is set into position on the

CLARIFICATION AND BIO-KINETIC® SERVICE (Page 4 of 5)



USE OF THE DRAIN VALVE TOOL

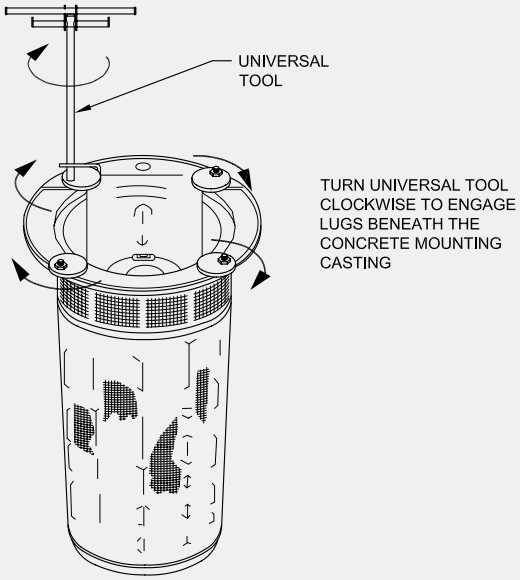
concrete ledge of the access opening, the Bio-Kinetic system discharge flange must engage the top of the cast in place receiving flange before proceeding.

19. Once in the proper position, carefully remove both the drain valve actuating tool and the universal tool. This will allow the drain valve to seal against the exterior bottom of the Bio-Kinetic system. Use the locking lug tool to twist each of the round, black locking lugs clockwise so that each of the lugs is rotated to the furthest extension point possible.

20. Reinsert the internal components from the replacement Bio-Kinetic system. Locate the level indicator mounted above the outlet of the Bio-Kinetic system flow distribution deck. The bubble should be resting squarely between the two lines in the clear plastic case. If the location of the bubble indicates the system is not installed in a level position, the flow deck should be leveled using the four adjustment lugs provided for this purpose. With the ratchet drive, extension and $^{7}/_{16}$" socket from the Tool Kaddy, turn each of the adjustment lugs until the bubble comes to rest squarely between the two lines in the clear plastic case.
    NOTE: Leveling of the flow distribution deck is essential for proper operation of the flow equalization ports, chemical feed tubes and effluent weir within the Bio-Kinetic system.

21. Remove the Bio-Kinetic system outlet sealing tool from in between the system outlet flange and the cast in place receiving flange of the Singulair tank.

22. The system service cover with information tag from the originally installed Bio-Kinetic system must be reinstalled in the tank. Install the cover, handle side up, by aligning the four holes in the cover with the four locking lug bolts. The cover will come to rest on the collar of the Bio-Kinetic system. There is no need to add fasteners to the locking lug bolts.



LOCKING DOWN THE BIO-KINETIC SYSTEM

EFFLUENT DISPOSAL SYSTEM CHECK

1. Determine if the effluent from the Singulair 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 Record Card.

2. Although the Singulair system effluent may be discharged and/or 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 Singulair 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 Singulair system outlet. A free-falling “grab” sample of effluent can be collected after the point of discharge has been

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WASTEWATER TREATMENT SYSTEM

CLARIFICATION AND BIO-KINETIC® SERVICE (Page 5 of 5)

thoroughly cleaned. Take note of effluent color, odor and the presence or absence of suspended particles. Accumulation of mud in the effluent disposal line or at its outlet can be a sign of a crushed or broken effluent line and should be reported to the owner. Foaming, odor or particulate sediment indicates that the Singulair system has not been providing adequate treatment. Recheck the entire system by using the Singulair Trouble-Shooting guide.

NOTE: An effluent "grab" sample allows a visual assessment and should only be used in conjunction with routine service and/or trouble-shooting 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 Record Card.

BEFORE YOU LEAVE THE FACILITY...

1. Make sure that both sides of all three Service Inspection Record 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 Record 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 with your company if the warranty or current service policy is nearing expiration.

4. Explain that the Singulair aerator is set to operate on a time cycle and should not be turned off even during extended periods of non-use. Explain also that the Singulair control center contains no user-serviceable parts and that the cover is secured with a tamper evident seal both for owner protection and protection of component parts.

5. Review the operation of the red warning light and audible alarm on the Singulair 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 special service.

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BIO-KINETIC® WASTEWATER TREATMENT SYSTEM

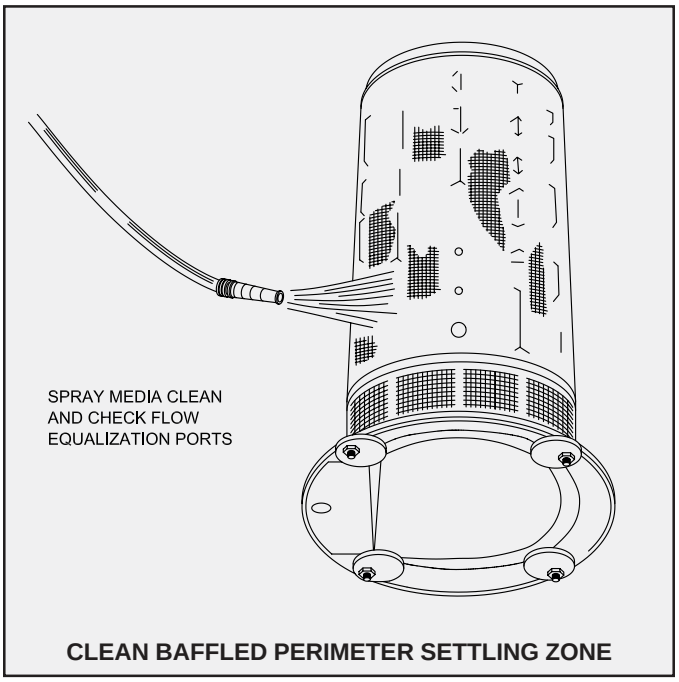
CLEANING AND DISASSEMBLY INSTRUCTIONS FOR THE BIO-KINETIC® SYSTEM

EQUIPMENT REQUIRED FROM THE BIO-KINETIC SYSTEM TOOL KADDY

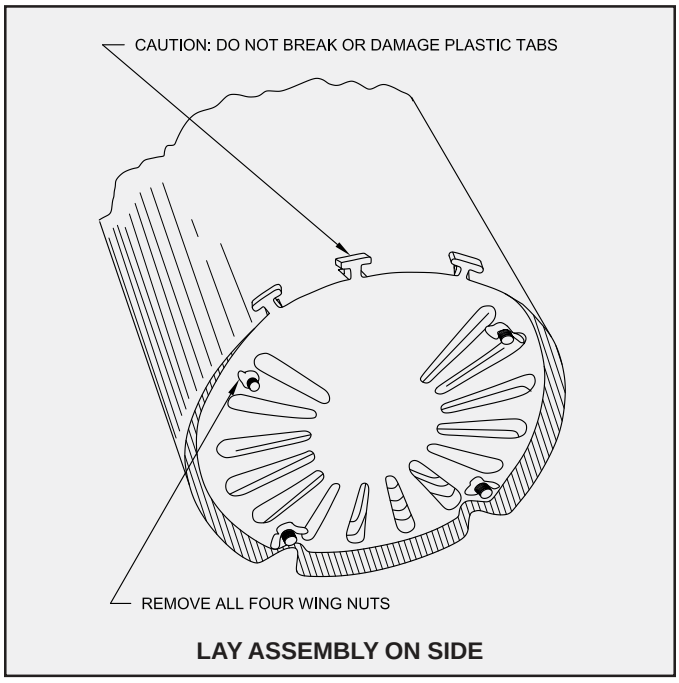
- ❑ water hose and spray nozzle
- ❑ Bio-Kinetic system universal tool
- ❑ rubber gloves
- ❑ safety face shield or goggles
- ❑ ratchet drive and $^{7}/_{16}$" socket

A fresh water supply and sewer drain are required for cleaning the Bio-Kinetic system.

1. Remove the Bio-Kinetic system from the service container. Rinse the container and lid. Rotate the four locking lugs to the outboard position on the Bio-Kinetic system. Remove the gasketed discharge flange assembly from the flow deck and rinse it with water.
2. Grasp the top flange of the system with one hand and insert the disassembly tool beneath each of the strap handles on the flow deck. Pull up on the disassembly tool to remove the flow deck and internal system components from the contact chamber and set aside. Use the water hose and spray nozzle to wash the inside of the contact chamber.
3. Use the water hose and spray nozzle to wash off the filter media. Continue spraying until all sludge and wastewater have been flushed from the media. Invert the filter assembly and flush accumulated material from the baffled perimeter settling zone. Inspect the perimeter settling zone to be certain that it is totally clean. Check the flow equalization ports to be sure they are clean and unobstructed.
4. Wash off any debris that has accumulated on the surface of the flow distribution deck and baffle wall shroud. Lay the assembly down on its side and remove the four wing nuts on the bottom. Remove and wash the bottom deck plate.



CLEAN BAFFLED PERIMETER SETTLING ZONE



LAY ASSEMBLY ON SIDE

CAUTION: Do not break or damage the molded plastic tabs on the edge of the bottom deck plate.

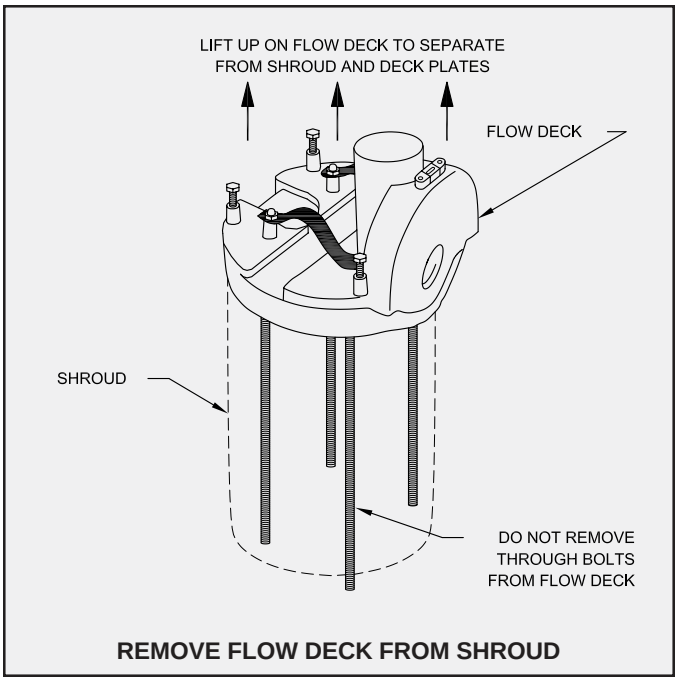
Do not remove the remaining deck plates at this time. Stand the assembly upright and lift up on the flow distribution deck to separate it from the baffle wall shroud and deck plates. You may find it helpful to hold the baffle shroud between your feet when lifting up on the flow deck.

NOTE: The through bolts will be removed from the shroud and deck plates when the flow deck is lifted

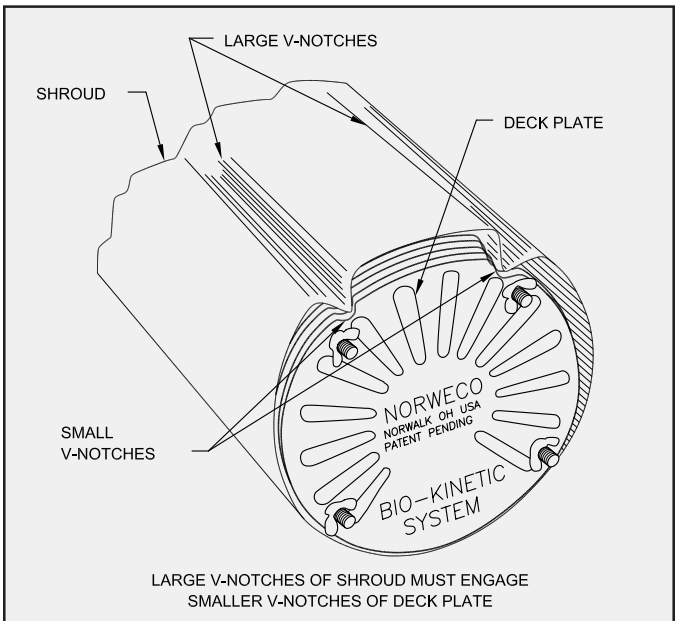
BIO-KINETIC® SYSTEM CLEANING AND DISASSEMBLY INSTRUCTIONS (Cont.)

off the baffle wall shroud. Do not remove the through bolts from the flow distribution deck. Rinse the flow distribution deck thoroughly inside and out. Inspect the weir and final discharge zone to be sure they are completely clean.

5. Lift up the baffle wall shroud to remove it from the deck plates. Rinse the inside and outside of the shroud and set it aside. Take the cleaned, round bottom deck plate and set it on the floor with the engraved name facing down.
6. Remove the top deck plate from the remaining stack and wash off both sides. When cleaned, set it on top of the cleaned, round bottom deck plate. Repeat this procedure with each deck plate until all plates are cleaned and reassembled into a single stack. Each deck plate is molded with four circular depressions in the bottom side of the plate and four round stand-off posts in the top side of the plate. When restacking the clean deck plates, make sure the four depressions on the bottom engage the top of the four posts below. All deck plates must be placed onto the stack baffle side up (engraving down). When properly assembled, all edges of each plate should be vertically aligned.
7. Lower the baffle wall shroud over the assembled stack of deck plates. The two large V-notches in the shroud should engage the smaller notches on the edge of the deck plates. Check the four leveling lugs on the flow deck. They must be unscrewed until they are flush with the bottom of the flow deck. Now position the flow distribution deck above the baffle wall shroud so that the outlet of the flow distribution deck is directly opposite the two large V-notches in the shroud. Insert each of the four through bolts through the holes in the top of the baffle shroud and into the stack of deck plates. Lower the flow distribution deck until it fully engages the top of the baffle shroud. Push each through bolt down into the assembly as far as it will go.
8. Lay the assembly on its side and push the through bolts through the bottom deck plate. Fasten a wing nut to each of the four through bolts where they project through the bottom deck plate. While tightening each wing nut, make sure the molded plastic tabs on the bottom deck plate engage the slots on the edge of the shroud. Tighten enough to insure all three tabs are fully engaged into the three slots in the shroud.
9. Lubricate the grommet in the outlet opening of the contact chamber. Grasp the strap handles and lower the flow deck and internal components into the cleaned contact chamber making sure to align the flow deck outlet with the outlet of the contact chamber. Apply a moderate amount of downward force until the outlet of the flow distribution deck aligns with the outlet of the contact chamber.
10. Place the assembled Bio-Kinetic system back into the cleaned service container. Place the discharge flange assembly onto the flow distribution deck. Now place the service container cover into position by aligning the four holes in the cover with the locking lug bolts. Add a wing nut to each of the lug bolts to hold the cover in place. Return the container to your service stock.



REMOVE FLOW DECK FROM SHROUD



LARGE V-NOTCHES OF SHROUD MUST ENGAGE
SMALLER V-NOTCHES OF DECK PLATE

DECK PLATE AND SHROUD ASSEMBLY

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BIO-KINETIC® WASTEWATER TREATMENT SYSTEM

FILTER MEDIA REPLACEMENT KIT INSTRUCTIONS

The filter media replacement kit is provided so that repair of a Bio-Kinetic system with worn or damaged media may be easily accomplished, if required, during the routine service cycle. Media replacement should be done only when necessary and only by a factory trained technician as part of maintaining a stock of exchange Bio-Kinetic systems. Media replacement should be performed at your place of business rather than at the installation site. Replacement of properly functioning media will not improve operational performance and is not recommended.

The filter media replacement kit contains the following items to be used during replacement:

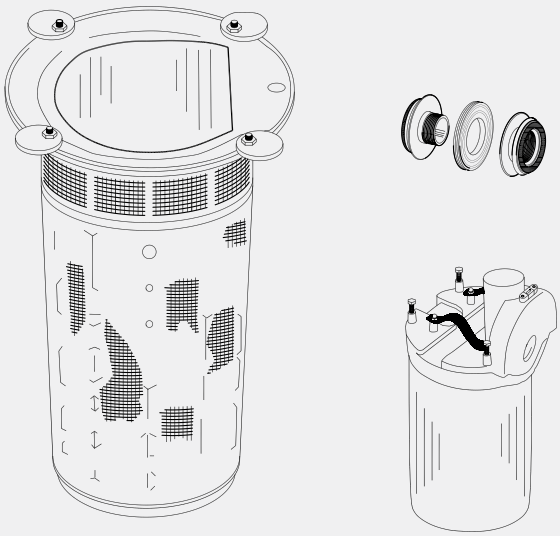
- ❑ One cylindrical filter media section, made up of design and peak flow media, lock-stitched together with bonded nylon thread for maximum strength and durability.
- ❑ Two retainer straps, one inserted into each stitched hem located at both ends of the filter media cylinder.
- ❑ One separate retainer strap to place around the outside of the center stitched seam connecting the peak flow and design flow media.

The following equipment is required from the Bio-Kinetic system Tool Kaddy:

- ❑ rubber gloves
- ❑ safety face shield or goggles
- ❑ retainer strap tool

No adhesive is necessary to attach the media to the Bio-Kinetic system when utilizing the replacement kit. Media replacement, when performed as outlined in these instructions, will bring the unit up to new system standards. For instructions regarding removal and reinstallation of the Bio-Kinetic system from the Singulair tank, refer to the instructions contained in the Clarification Chamber and Bio-Kinetic Service section of the Singulair Service Manual.

1. Remove the Bio-Kinetic system from the service container. Rinse the container and lid. Rotate the four locking lugs to the outboard position on the Bio-Kinetic system. Remove the gasketed discharge flange assembly from the flow deck and rinse it with water.

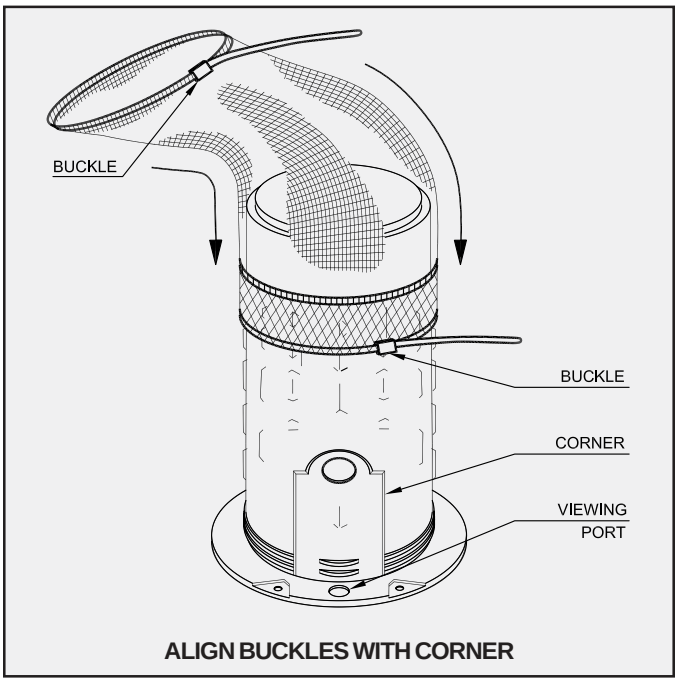


REMOVE FLOW DECK, COMPARTMENTED SETTLING ZONE AND INTERNAL COMPONENTS FROM CONTACT CHAMBER

2. Insert the disassembly tool beneath each of the strap handles on the flow deck. Pull up on the disassembly tool to remove the flow deck and internal system components from the contact chamber and set the internal components aside. Use the water hose and spray nozzle to wash the inside of the contact chamber.
3. Use the water hose to wash off the filter media. Spray until all sludge and dirt have been flushed from the media. Now invert the filter assembly and flush accumulated material from the baffled perimeter settling zone. Inspect the perimeter settling zone to be certain that it is totally clean. Check the flow equalization ports to be sure they are clean and unobstructed.
4. Remove the black rubber outlet grommet from the outlet opening. With a knife, cut and remove the three retainer straps and the old filter media from the Bio-Kinetic system. Take care not to damage the contact chamber or baffled perimeter settling zone. Clean any accumulation of adhesive from the horizontal grooves at the top, middle and bottom of the contact chamber. With a wet rag, clean the outside of the contact chamber to insure ease of installation of the new filter media and straps. Inspect the design flow, sustained flow and peak flow ports again to be sure they are clean and unobstructed. Be sure there are no burrs on the inside, as well as, the outside surface of each port.

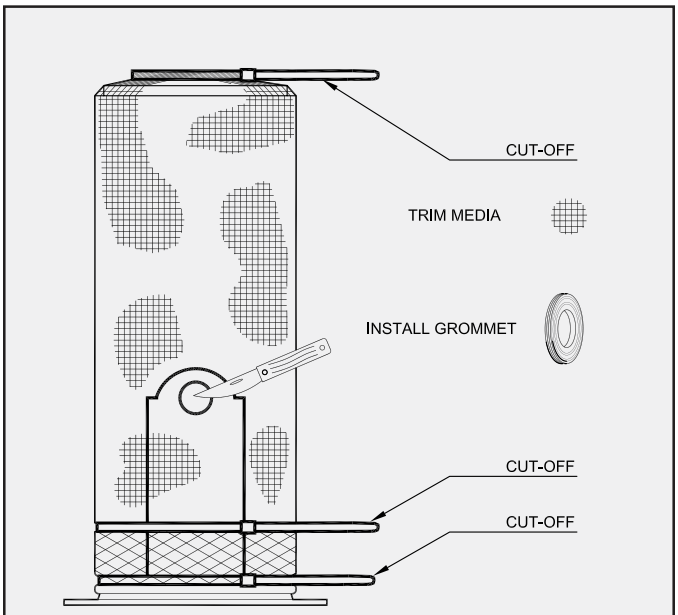
FILTER MEDIA REPLACEMENT KIT INSTRUCTIONS (Cont.)

5. Remove the locking lugs, bolts, nuts and washers from the top flange of the Bio-Kinetic system. Turn the contact chamber over with the top flange resting on a clean even surface.
6. Starting with the peak flow filter end, slide the replacement filter media cylinder onto the contact chamber. The filter media cylinder will fit tightly against the baffles of the perimeter settling zone. Some effort will be required to slide the media over the contact chamber. Rubber gloves will provide the friction necessary for proper media installation. Be careful not to damage the filter media or retainer straps.
7. The stitched hem at each end of the filter media cylinder has a retainer strap with plastic buckle. Install the filter media so that the retainer strap buckle is seated on the corner of the outlet boss of the contact chamber. This position is on the corner closest to one of the locking lugs on either side of the viewing port.



ALIGN BUCKLES WITH CORNER

8. Engage the peak flow retainer strap into the horizontal groove closest to the top flange of the contact chamber. Once in position, tighten the strap with the retainer strap tool. The strap should be tightened enough to permanently locate the filter media in position. Make sure the buckle remains on the corner of the outlet boss. Do not over-tighten the strap. Over-tightening could warp the contact chamber. Once the strap is secured, cut off the excess strapping material with the retainer strap tool.
9. Attach the retainer strap tool to the strap at the bottom of the design flow media. Tighten the strap until all wrinkles have been removed from the filter and the media cylinder is taut and firmly drawn against the baffles of the contact chamber. Do not over-tighten the media. Cut off the excess strapping material with the strap tool.



TRIM MEDIA FROM OUTLET WITH KNIFE

10. Place the third, separate retainer strap over the seam that joins the design flow and peak flow media. Make sure this strap is properly engaged in the locating grooves molded into the baffles of the contact chamber. Place the buckle on the edge of the outlet boss in alignment with the other two. Using the retainer strap tool, tighten the strap over the seam and secure the buckle on the outlet boss corner. Once the strap has been firmly tightened, cut off the excess strapping material with the strap tool.
11. With a knife, trim the media from the outlet of the Bio-Kinetic system using the outlet opening as a guide. The hole in the filter media should not be larger than the outlet opening. Remove the trimmed media and reinstall the black rubber grommet. **NOTE:** When reinstalling the grommet, make sure the media surrounding the outlet opening stays between the contact chamber and the outboard flange of the grommet. Correct reinstallation of the grommet is important for proper Bio-Kinetic system operation.
12. Reinstall all four locking lugs with the bolts, nuts and washers originally supplied.

Proceed with the remaining steps outlined in Bio-Kinetic System Cleaning and Disassembly Instructions. If no service is required, reassemble the Bio-Kinetic system according to Bio-Kinetic Cleaning and Disassembly Instructions and return the system to your service stock.

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BIO-KINETIC® WASTEWATER TREATMENT SYSTEM

TROUBLE-SHOOTING

During service inspections you may periodically encounter a situation which, if not identified and corrected, will result in interruption of service for the Singulair system. This trouble shooting 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 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 trouble-shooting 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:

- ✓ A member of your service staff, factory-trained and certified by Norweco, is dispatched to answer the call.
- ✓ Installation and service records for the particular system are up-to-date and have been reviewed.
- ✓ The service technician has a copy of the Singulair Service Inspection Manual.
- ✓ The service vehicle has loaner aerators, exchange aerators, Bio-Kinetic Service Cart, exchange Bio-Kinetic systems 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 TROUBLE-SHOOTING

MUD OR SILT IN SINGULAIR SYSTEM OR BIO-KINETIC SYSTEM*

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
Singulair tank structurally damaged	Excavate and patch or replace tank
Singulair casting joint improperly sealed	Excavate and seal with non-shrink grout

*Have Singulair system pumped to remove mud after repairs have been completed. Multiple pumping may be required to remove all mud from the Singulair system. See: Singulair Tank Pumping Instructions.

TROUBLE-SHOOTING (Cont.)

SEPTIC ODOR IN SINGULAIR SYSTEM

Aerator turned off	Place control center selector switch in “automatic” position
Insufficient air delivery by aerator	Service aerator
Aspirator shaft plugged with deposits	Remove from aerator and flush with shaft cleaning hose
Aspirator orifices plugged with deposits	Remove deposits
Water softener backwash discharging into system	Have owner remove backwash line from system
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
Incomplete treatment due to hydraulic overloading	See “Hydraulic Overloading”
Periodic septic odor for no reason	Have sanitary sewer vent checked

HYDRAULIC OVERLOADING OF SINGULAIR SYSTEM

Ground water entering system through tank joint	Excavate and seal with non-shrink grout
Ground water entering system through crack in side wall	Excavate and patch with non-shrink grout
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 Singulair system influent line	Have contractor relocate improper connection downstream of Singulair system

ORGANIC OVERLOADING OF SINGULAIR SYSTEM

Aeration chamber settled solids test reads in excess of 75%	Evaluate pretreatment chamber - See Singulair Tank Pumping Instructions
Aeration chamber solids appear black	Evaluate pretreatment chamber - See Singulair Tank Pumping Instructions

FLOATING SOLIDS IN CLARIFICATION CHAMBER OR PLANT EFFLUENT

Excessive sludge on clarifier sidewalls	Scrape hopper side walls
Restriction of Bio-Static or sludge return port	Remove obstruction
Pretreatment chamber discharging excessive solids	Evaluate pretreatment chamber - See Singulair Tank Pumping Instructions
Hydraulic overloading of system	See “Hydraulic Overloading”

CONTROL CENTER WARNING LIGHT GLOWS/AUDIBLE ALARM SOUNDING

Liquid in tank at level of foam restrictor	See “Singulair System Flooded”
Aerator drawing excessive current	See “Aerator Drawing Excessive Current”
Dead short in power line to aerator	Have owner call his electrician

PROGRESS THROUGH norweco **SERVICE SINCE 1906**

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BIO-KINETIC® WASTEWATER TREATMENT SYSTEM

AERATOR TROUBLE-SHOOTING

AERATOR WILL NOT OPERATE

Electrical service to aerator interrupted	See “No Electrical Power from Control Center to Aerator”
Voltage supplied is insufficient to start aerator*	Report condition to power company
Defective bearing, windings or insulation in motor	Return entire aerator to factory
Debris wound on aspirator shaft	Remove debris with knife
Aspirator shaft bent	Return entire aerator to factory
Foam restrictor or entire aerator under water	See “Singulair System Flooded”

*If you suspect low voltage, check the voltage at the watertight electrical connector, not at the Singulair control center. If voltage above 103 or more is measured, check the other possibilities listed in this section.

AERATOR DRAWING EXCESSIVE CURRENT

Foam restrictor partially under water	See “Singulair System Flooded”
Debris on aspirator shaft	Remove debris with knife
Motor failure	Return aerator to factory
Insufficient voltage (less than 103 volts)	Report condition to power company
Excessive voltage (greater than 126 volts)	Report condition to power company

AERATOR MAKING EXCESSIVE NOISE

Rubber shock absorbers on brackets worn	Replace shock absorbers
Bearing failure in aerator motor	Return aerator to factory
Noise is generated by excessive vibration	See “Aerator Operates With Excessive Vibration”

AERATOR OPERATES WITH EXCESSIVE VIBRATION

Debris on aspirator shaft	Remove debris with knife
Aspirator shaft bent	Return entire aerator to factory
Aerator mounting brackets bent	Straighten brackets
Top aerator brackets not seated evenly	Adjust mounting brackets
Aspirator shaft installed too tightly on intermediate shaft	Reinstall aspirator shaft with set screws finger tight only If condition persists return entire aerator to factory
Aspirator shaft installed with improper alignment to intermediate shaft	Reinstall aspirator shaft to factory alignment marks

AERATOR OPERATES BRIEFLY BEFORE CIRCUIT BREAKER TRIPS

Aerator is drawing excessive current	See “Aerator Drawing Excessive Current”
Aerator is partially under water	See “Singulair System Flooded”
Aspirator shaft bent	Return entire aerator to factory
Moisture has entered aerator motor	Return entire aerator to factory

AERATOR TROUBLE-SHOOTING (Cont.)

ELECTRICAL TROUBLE-SHOOTING

CAUTION: Before initiating any electrical component inspection or repair, turn off all power to the Singulair system by switching off the dedicated circuit breaker in the main electrical service panel and then testing with the electrical multi-meter. Repair should always be made by a qualified electrician using proper procedures and safe tools. Make sure all circuits are properly grounded. Do not stand in damp locations when making electrical system tests. Always use tools with insulated handles for electrical repairs.

NO ELECTRICAL POWER FROM ELECTRICAL SERVICE PANEL TO CONTROL CENTER

Circuit breaker in electrical service panel has tripped	Turn breaker to “off” position, then turn “on”
Fuse in electrical service panel has blown	Have owner replace fuse
Circuit breaker in electrical service panel turned “off”	Turn breaker “on”
Loose connection in electrical service panel	Tighten all connections: First, shut off breaker in main electrical service panel
Defective circuit breaker in electrical service panel	Have owner replace circuit breaker
Corrosion on contacts prevents flow of current	Clean or replace contacts
Incomplete circuit - neutral not properly wired	Have owner wire directly to neutral bar
Power cable from service panel to Singulair control center severed	Have owner locate break and repair

NO ELECTRICAL POWER FROM CONTROL CENTER TO AERATOR

Singulair control center terminal A1 and neutral read zero voltage	Place selector switch in “continuous” position. If voltage is read, place selector switch in “automatic” position and rotate time clock knob until voltage is read. If no voltage can be read, replace control center insert.
Singulair circuit breaker has tripped	Push reset breaker
Singulair circuit breaker is defective	Replace breaker
Singulair selector switch turned “off”	Turn switch to “automatic” operation
Singulair selector switch defective	Replace control center insert
Corrosion on terminals prevents flow of current	Clean or replace contacts
Power cable from Singulair control center to aerator damaged	Locate damage and repair
Loose wiring connection	Check all connections

AERATOR WILL NOT START

Reset breaker in Singulair control center tripped	Push reset breaker
Loss of power to Singulair control center	See both “No Electrical Power” sections
Insufficient voltage present at aerator	Report condition to power company
Watertight electrical connector not properly engaged	Remove watertight electrical connector and plug in tightly
Watertight electrical connector not properly wired	Rewire watertight electrical connector
Defective motor	Return entire aerator to factory

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BIO-KINETIC® WASTEWATER TREATMENT SYSTEM

BIO-KINETIC® SYSTEM TROUBLE-SHOOTING

SINGULAIR SYSTEM FLOODED

Bio-Kinetic system plugged	See “Bio-Kinetic System Plugged”
Tank outlet plugged	Clean debris from tank outlet
Groundwater relief point restricted	Remove obstruction
Disposal field plugged	Notify owner immediately
Effluent pump failure	Repair or replace effluent pump
Surface water drains toward Singulair tank	Have contractor regrade and/or install risers
Outlet line installed with insufficient fall	Have contractor correct
Outlet line crushed or filled with debris	Have contractor clean or replace
Effluent disposal lines installed with insufficient fall or have settled	Have contractor correct or replace

BIO-KINETIC SYSTEM PLUGGED

Mud has fouled filter media	See “Mud or Silt in Singulair System”
Organic overloading	See “Organic Overloading”
Hydraulic overloading	See “Hydraulic Overloading”
Water softener backwash discharging into system	Have owner remove backwash line from system
Solids flowing in from pretreatment chamber	Evaluate pretreatment chamber - See Singulair Tank Pumping Instructions
Incomplete treatment due to aerator shut-off	Place control center selector switch in “automatic” position
Internal components flooded	Remove and service Bio-Kinetic system
Grease or inorganic matter on filter media or in clarification chamber	Evaluate pretreatment chamber - See Singulair Tank Pumping Instructions

BIO-KINETIC SYSTEM PLUGGED (Cont.)

Compartmented contact chamber plates plugged	Clean chamber plates
Outlet weir obstructed	Inspect and clean outlet weir

CAUTION: Never allow chemical wastes, grease or mud to enter the Singulair system. These materials alter the desirable characteristics of activated sludge and will cause severe problems in the performance of the system.

PROGRESS THROUGH norweco® **SERVICE SINCE 1906**

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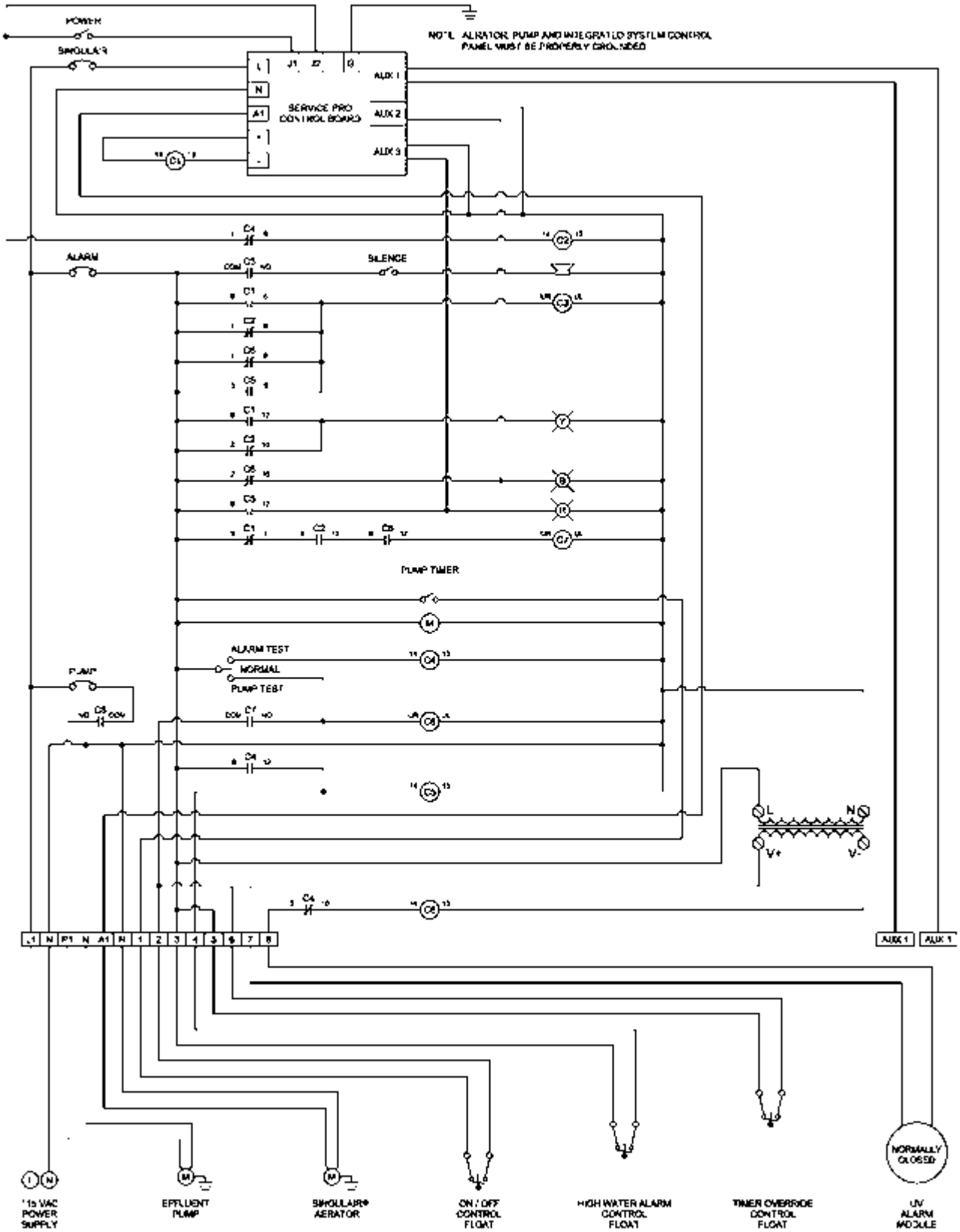
120 VOLT - 1Ø - 60 Hz - 20 AMP SERVICE



GENERAL NOTES:

1. A DEDICATED 20 AMP CIRCUIT BREAKER AT MAIN SERVICE PANEL SHOULD NOT BE ENERGIZED UNTIL THE AERATOR IS INSTALLED AND READY TO BE PLACED INTO OPERATION.
2. INSURE THE AERATOR IS OPERATING WHEN THE FACILITY IS OCCUPIED
3. THE LOCAL LICENSED NORWECO DISTRIBUTOR WILL PLACE THE AERATOR INTO SERVICE.

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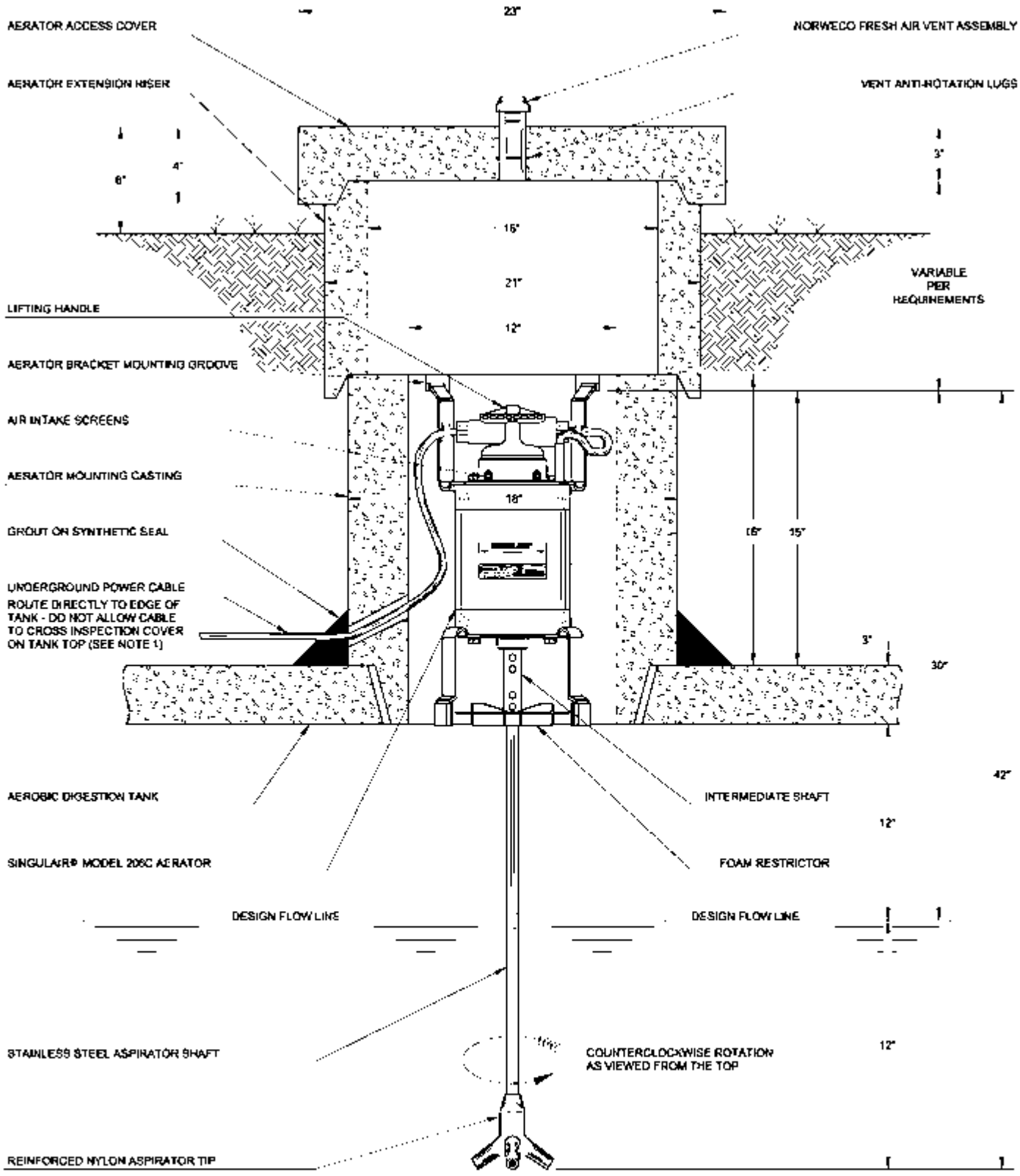
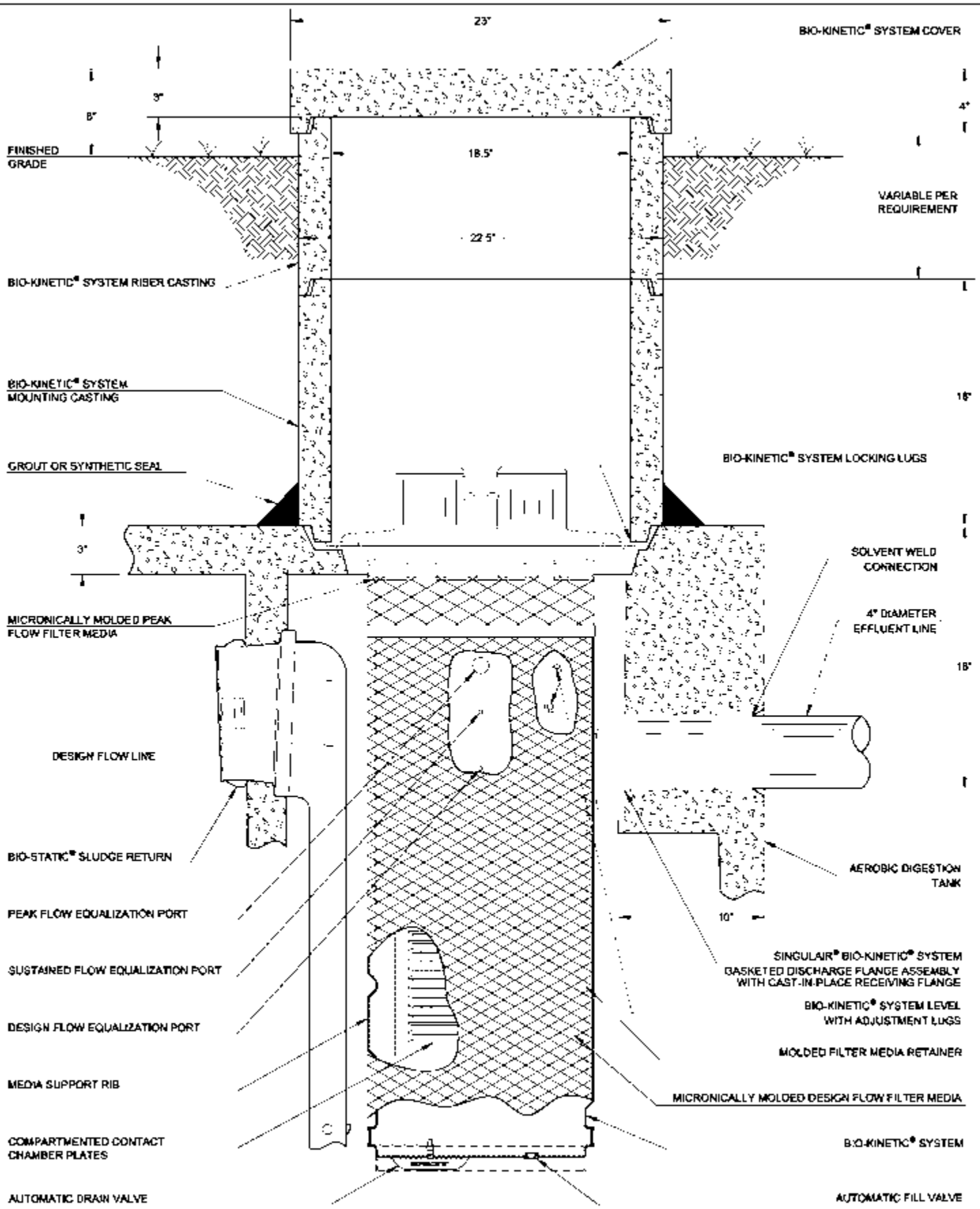


GENERAL NOTES:

1. UNDERGROUND POWER SUPPLY MUST BE WIRED INTO AN APPROVED SINGULAIR® CONTROL CENTER.
2. SINGULAIR® CONTROL CENTER MUST BE WIRED INTO A SEPARATE 10 AMP CIRCUIT BREAKER AT MAIN ELECTRICAL SERVICE PANEL IN THE FACILITY.
3. AERATOR AND AERATOR CONTROL CENTER MUST BE PROPERLY GROUNDED.
4. THE LOCAL, LICENSED NORWECO DISTRIBUTOR WILL PLACE THE AERATOR INTO SERVICE.

U.S. AND FOREIGN PATENTS PENDING	norweco	7-6-00 / 0
	MODEL 206C SINGULAIR® AERATOR MOUNTING AND INSTALLATION DETAIL	JMM / GJS / 1-8-96 / NTS
		PC-5-7600



GENERAL NOTES:

① AFTER INSTALLATION, ALL CHAMBERS OF THE SINGULAIR TANK SHOULD BE FULL TO THE FLOW LINE WITH CLEAN HOLD DOWN WATER

② INTERNAL AND EXTERNAL PRESSURE EQUALIZATION ON THE BIO-KINETIC SYSTEM IS MANAGED AUTOMATICALLY BY THE DRAIN VALVE AND FILL VALVE.

U.S. AND FOREIGN PATENTS PENDING

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BIO-KINETIC® MOUNTING AND INSTALLATION DETAIL

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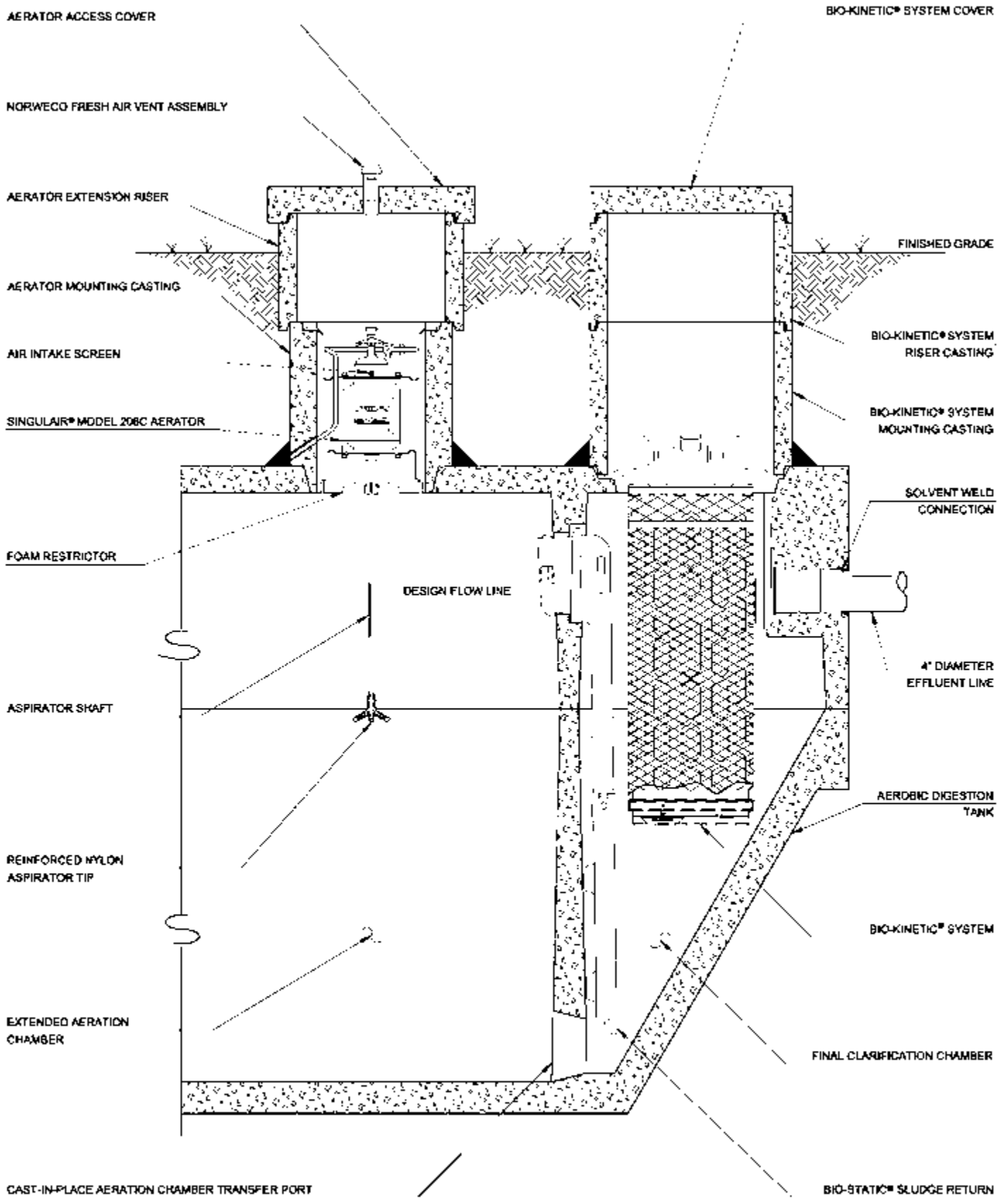

GENERAL NOTES:

① BIO-STATIC® SLUDGE RETURNS MUST BE INSTALLED PRIOR TO INSTALLATION OF THE BIO-KINETIC® SYSTEM MOUNTING CASTINGS.

② ONE BIO-STATIC® SLUDGE RETURN ASSEMBLY IS REQUIRED FOR 500 GPD, 750 GPD AND 1000 GPD SYSTEMS. TWO BIO-STATIC® SLUDGE RETURN ASSEMBLIES ARE REQUIRED FOR 1250 GPD AND 1500 GPD SYSTEMS.

③ THE BIO-STATIC® SLUDGE RETURN IS INSTALLED IN THE FINAL CLARIFICATION CHAMBER DURING TANK SETTING

④ ONCE INSTALLED, THE BIO-STATIC® SLUDGE RETURN REMAINS IN PLACE AND NEEDS NO SERVICE OR MAINTENANCE.

U.S. AND FOREIGN PATENTS PENDING

norweco

BIO-STATIC® SLUDGE RETURN MOUNTING AND INSTALLATION DETAIL

BDS

JMM

9-13-07

NTS

PC-S-710.1