SINGULAIR®
INDIVIDUAL HOME
WASTEWATER TREATMENT PLANT
with
BIO-KINETIC®
SYSTEM

PROGRESS THROUGH norweco® SERVICE SINCE 1906
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.

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.
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.
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 microorganisms 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.
Consider the facts:

- The Singulair Bio-Kinetic System meets or exceeds government standards. The Singulair System is performance certified and listed by NSF International. The Singulair is certified to NSF Standard 40 and our Bio-Kinetic System is certified to NSF Standard 46. Underwriters Laboratories and the Canadian Standards Association have recognized, certified and/or listed all electromechanical components. The auto dialer telemetry system is licensed by the Federal Communications Commission.
- The Bio-Kinetic System includes 3 positive filtration zones with 8 independent settling zones.
- 48-hour retention in the Singulair System reduces pumping frequency as compared to smaller capacity systems.
- Operating costs are low. The only electrical component is our low RPM aerator.
- Excessive hydraulic flows can cause major problems for septic tanks, sand filters and any treatment method that does not provide flow equalization. The exclusive non-mechanical flow equalization feature of our Bio-Kinetic System guarantees that all incoming wastewater is fully treated, regardless of heavy use periods.
- You can install an efficient Singulair plant for about the same cost as an old-fashioned septic tank.
- Eliminates odors and all unsightly, unsanitary conditions so common with septic tanks.
- Durable, reliable components are safely installed out-of-sight below grade. No exposed power cords, compressors, filters or air lines accessible to children or pets.
- No need to purchase a separate tank – our precast concrete pretreatment chamber is part of the Singulair System.
- The Singulair System automatically equalizes influent and effluent flow through all treatment and disposal stages. Flow variations from guests, parties or vacations do not effect treatment performance.
- All flow is equalized an average of 50% at the NSF Standard 40 600 GPD (gallons per day) design loading pattern.
- Your local, factory-trained, certified and licensed Norweco distributor sells, installs and services your Bio-Kinetic System with pride. You’ll find your distributor’s name and contact info conveniently posted on the system’s control center.

**Optional Blue Crystal® Residential Disinfecting Tablets**

Our Pure Calcium Hypochlorite Tablets are specially formulated for use in the Singulair system for efficient, reliable disinfection. Each blue crystal tablet contains at least 70% available chlorine. Packaged in re-sealable containers, our tablets are available from your local Norweco distributor in 10 and 100 pound polyethylene pails.

**Optional Bio-Neutralizer® Dechlorination Tablets**

Reliably, safely and economically reduce residual chlorine and protect environmentally sensitive surface water with our specially formulated tablets. Packaged in easy to handle, re-sealable containers, our Bio-neutralizer dechlorination tablets are available in 25 and 45 pound polyethylene pails from your local Norweco distributor.
Singulair is warranted against defects in material and workmanship under normal use and service by a comprehensive Lifetime Warranty and Exchange Program. This 3 year Limited Warranty and Lifetime 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.

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.

Our Service Pro Control Center is the up-to-the-minute way to manage your Norweco Singulair treatment system. It’s the only control center that employs revolutionary Monitoring, Compliance and Diagnostic (MCD) Technology. It automatically operates the treatment plant, monitors system operations and provides verification of all service work performed. Detailed information describing the performance of the Singulair treatment plant is accessible 24/7 via our password encoded website. Please consider the facts presented in this brochure. You will see why our Service Pro Control Center is the only management tool your treatment system needs and why Norweco is recognized as providing today’s answer for the protection of tomorrow’s environment.
This is all you need to keep your treatment system running smoothly at peak performance

The Service Pro Control Center uses Norweco Monitoring, Compliance and Diagnostic (MCD) Technology to automatically...

1. Operate each Norweco Singulair aerator and all wastewater treatment system components
2. Monitor their operations
3. Verify any service work performed on the aerator and all other system components
4. Provide secure 24/7 access to detailed history reports for each Singulair System on the Service Pro network at www.servicepromcd.com

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The Service Pro Control Center is linked via telemetry to Norweco’s Service Pro website. MCD technology allows remote operational oversight of Singulair Systems and real-time tracking of all service. Confirmation of proper system operation and the amount of time spent during each service visit are all reported and permanently recorded by the Service Pro website. If ever an alarm condition is received the registered service provider is automatically notified. Detailed service reports and an operational history for all Singulair Systems equipped with a Service Pro Control Center are available on the secure, password protected website.
Consider the facts:

- Built-in telemetry device uses the household phone or internet connection to communicate directly with the Monitoring, Compliance and Diagnostic database. The Service Pro Control Center’s programming code is securely maintained in a nonvolatile memory – all service data is fully protected against risk of a power outage.

- No unnecessary service calls. Self-diagnostic technology evaluates any Singulair alarm condition. If the condition is temporary, the Service Pro Control Center automatically resets without activating the alarm and telemetry system. In the event of a more serious problem, both alarms and the telemetry system are activated to automatically notify your local Norweco service provider.

- Notification of your local Norweco service provider in the event of a Singulair alarm condition by fax, email or phone is immediate and continues until the required service has been performed.

- Customized service reports are automatically generated. Your licensed distributor can tell on a daily basis which systems are due for service and when service contracts are due for renewal.

- A complete service history for every Singulair System with Service Pro Control Center is recorded and maintained online at www.servicepromcd.com and can be easily accessed any where, any time.

- Each service record is absolutely secure and only a mouse-click away for Singulair plant owners, the local Norweco distributor, service providers and local regulatory agency personnel. Each individual is issued a unique password that allows limited access to enclosed areas of the Service Pro website. The password determines which level of access is available to the password holder.

- The secure Service Pro Control Center enclosure contains knockouts for all incoming and outgoing wiring. Without even a screwdriver or a pair of pliers, you can connect the Service Pro panel to any residential phone line or Internet connection.

- Fully warranted. The Service Pro Control Center is protected by Norweco’s single source warranty program. Registration is automatic.

- Use of the Service Pro Control Center is not limited to new construction. Existing Singulair Systems can be easily added to the Service Pro network and remotely monitored. All that is necessary is the installation of a telephone line or Internet connection.

- Operation and maintenance of a Singulair treatment plant and up to three additional components of the wastewater treatment system can be remotely monitored by the Service Pro Control Center and website. Proper operation of the entire treatment system is confirmed by the MCD Technology. Every alarm condition and the amount of time spent on each service call are permanently recorded and readily accessible for performance oversight.

- Precision engineered and easily installed for comprehensive owner protection, the Service Pro Control Center and web based management system capably handle all residential wastewater treatment applications. The once and for all answer to guarantee proper operation and maintenance is only a mouse-click away.

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

Specify the SERVICE PRO® Control Center with MCD technology

The licensed factory-trained Norweco distributor in your area is ready to get a Singulair System and Service Pro Control Center up and running for you today. The control center and Service Pro website provide a powerful management tool that can monitor system performance, verify compliance with installation requirements and diagnose the operation of all system components. The Singulair System, Service Pro Control Center and Service Pro website combine to deliver state-of-the-art performance and homeowner protection. Remote monitoring and the web based management of site specific functional information assure years of reliable wastewater treatment and trouble-free operation. For additional information contact your local Norweco distributor today!
comprehensive protection, guaranteed

Our Service Pro Control Center with revolutionary MCD technology is sold, installed and serviced by your local factory-trained and licensed Norweco distributor. It is warranted against defects in material and workmanship under normal use and service for three years from the installation date. Continuing protection is maintained by the Service Pro Control Center and website for the life of the remote monitoring agreement.
Just because you live in an area that isn’t served by municipal sewer lines, you don’t have to endure all the problems that come with septic tanks. Bad odors, pollution, costly maintenance and failures are easily eliminated with the BK 2000, the wastewater management system that protects everything that is most important to you – your home, family and environment.

Wastewater management is a critical part of suburban and rural real estate development. Failures cause problems that are expensive to repair and damage that is hard to clean up. With so much at stake, it is vitally important to make the right water and wastewater treatment decision. We’ve been providing progress through service since 1906. When you consider the facts presented in this brochure, you’ll see why Norweco is recognized as today’s answer for the protection of tomorrow’s environment.
How the BK 2000 System manages the treatment process

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

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

**Removable Moisture/Vapor Shield**
This shield prevents condensation from entering the system. Built-in collars secure our optional chemical feed tubes.

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

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

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

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

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

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

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

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**Gasketed Rings and Extension Risers**

They are available for installations that require additional basin capacity or depth. Rings and risers are available in heights from 6” to 72” as required.

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**NSF Certified Chlorine Dispenser**

Our dispenser makes it easy to properly disinfect or dechlorinate the wastewater flow. When used with our Blue Crystal or Bio-neutralizer tablets, it’s listed under NSF/ANSI Std. 46, Section 11 for safe, effective use.

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**Molded Lockable Compression Clamp**

It locks the access cover, riser and ring sections in position. The clamp is secured by a stainless steel fastener or an optional padlock.
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Specify BK 2000

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

The BK 2000 System can be easily installed as part of any wastewater treatment system. The compact, easily transported basin is equipped with built-in connections for inlet and outlet piping, allowing installation to be completed in just hours. Extensive excavation work and revisions to existing landscaping are not required. There are no complex piping connections or electrical hookups. The BK 2000 System and its advanced treatment features begin working immediately.
The BK 2000 is warranted against defects in material and workmanship under normal use and service for 10 full years. This limited warranty provides comprehensive, single source protection and covers all BK 2000 System components. Complete warranty information, a Warranty Registration Card and Owner’s Manual are included with purchase.
AT 1500
ULTRAVIOLET DISINFECTION
the safe, effective and reliable way to disinfect in applications where ultraviolet (UV) treatment is preferred.

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

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

solutions in wastewater treatment
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Specify Norweco UV Disinfection

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

The compact design and rigid construction of the system makes installation quick and easy. The treatment chamber is constructed from carbon-impregnated ABS plastic that is resistant to ultraviolet light and the engineered flow path assures disinfection quality.
The AT 1500 UV disinfection system reduces bacteria levels to meet strict water quality standards

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

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

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

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

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

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

**Dual-Pass Design**
Extended treatment time and exposure to UV light allow for maximum disinfection and performance for stringent environmental standards.

**NEMA 4X Electrical Enclosure with Internal Ballast**
The compact electrical enclosure provides a watertight and weatherproof connection for all power lines to the system. The ballast is located safely inside this durable enclosure for protection and long-life. The green light located on the side of the enclosure is constantly lit to indicate proper operation.

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

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

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

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

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

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

**Blue Crystal® Residential Disinfecting Tablets**
OUR PURE CALCIUM HYPOCHLORITE TABLETS ARE SPEICALLY FORMULATED FOR USE IN RESIDENTIAL SYSTEMS FOR EFFICIENT, RELIABLE DISINFECTION. EACH TABLET CONTAINS AT LEAST 70% AVAILABLE CHLORINE. PACKAGED IN RE-SEALABLE CONTAINERS, OUR TABLETS ARE AVAILABLE FROM YOUR LOCAL NORWECO DISTRIBUTOR IN 1.9, 10 AND 100 POUND POLYETHYLENE PAILS.
We are committed to helping you keep your customers safe and the environment clean. The AT 1500 is the only UV treatment system listed with Underwriters Laboratories (UL) for residential disinfection applications.

Consider the facts:

- Dual-pass design assures the integrity of the treatment process. All liquid flowing through the system is treated twice by the UV lamp, once on the way down and again on the way back up. This doubles the exposure to UV light and greatly improves treatment.
- All electrical components are contained in a NEMA 4X weatherproof electrical enclosure. These components control the disinfection process and assure treatment integrity. The gasketed cover is secured with screws to seal the enclosure.
- Our long-life lamp is designed and tested to be superior to competitive products currently used in onsite wastewater treatment. The bulb is stronger and provides more complete disinfection.
- The lighting ballast is contained within the gasketed electrical enclosure to assure maximum life. Competitive systems leave the ballast exposed to the treatment environment.
- Disinfection quality is assured by a corrosion resistant solid state circuit board that continually monitors system performance. A current sensing circuit automatically gives immediate notification should a service interruption occur.
- Easy to install and maintain. The entire UV process is contained within a convenient ABS disinfection chamber. Optional concrete or high-density polyethylene enclosures are also available to provide additional treatment.
- No chemical residual or harmful by-products. The AT 1500 UV disinfection system provides superior treatment and its performance is independent of the pH, temperature and ammonia content of the effluent being treated.
- Low electrical usage. The high efficiency electrical controls use very little electricity.
- Inexpensive to install and operate. The AT 1500 can be installed for less than some chemical feed systems, and requires no recurring chemical purchase. The only maintenance requirement is periodic cleaning of the Teflon cover.
- Can be used to eliminate contaminants not readily removed by chemical treatment. Advanced Oxidation Processes (AOP) can be constructed by supplementing the AT 1500 system with ozone or H$_2$O$_2$ to remove chemical resistant pollutants, such as certain pharmaceuticals and methyl tertiary butyl ether (MTBE).

**Bio-Max® Dechlorination Tablets**

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

**Bio-Dynamic® Tablet Feeders**

BIO-DYNAMIC TABLET FEEDERS PROVIDE LOW COST, EFFECTIVE DISINFECTION AND DECHLORINATION OF SECONDARY EFFLUENT IN LESS SENSITIVE RECEIVING ENVIRONMENTS. EMPLOYING FLOW PROPORTIONAL CHEMICAL DOSAGE WITHOUT MOVING PARTS OR ELECTRICAL COMPONENTS, THE COMPACT TABLET FEEDERS INSTALL EASILY AND PROVIDE UNMATCHED DURABILITY.
The AT 1500 disinfection system is warranted against defects in material and workmanship under normal use and service by a comprehensive 2 year warranty. This limited warranty provides single source protection and covers all system components. A warranty registration card is included with every new AT 1500 Installation and Operation Manual.

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

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BIO-DYNAMIC®
DRY CHEMICAL TABLET FEEDERS
AND TABLETS
The **safe**, effective and economical **way** to consistently disinfect and dechlorinate water and wastewater

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

*solutions in wastewater treatment*
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Specify Norweco® Bio-Dynamic® Dry Chemical Tablet Feeders and Tablets

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

From project inception through final plan review, procurement, installation and operation, Norweco’s team of experienced engineers and customer service personnel are available to assist you with your project. Backed by an extensive library of drawings, project research and decades of hands-on experience, we focus on keeping you on schedule and under budget.
The exclusive multi-tiered flow deck delivers consistent chemical treatment, regardless of flow rate

Flow surges are common in any treatment system. This variation in flow rate can cause major problems for conventional tablet feeders and manually adjusted gas or liquid chemical feed systems. That’s why we engineered a multi-tiered flow deck to enhance the fluid dynamics of the liquids passing through the system. During low flow, usually at night, liquids are directed through the inert drainage tier, the lowest tier of the feeder. It forms a narrow hydraulic channel that increases the velocity of the flow for uniform tablet exposure. When flow increases during morning hours, the liquid flow rises to the intermediate flow tier. It creates a flume to accelerate the flow passing the tablets. When the flow rate is greater than the capacity of this intermediate tier, liquids rise to the upper flow tier. That tier causes the liquid to lose velocity, preventing excessive tablet consumption.

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

Compact Bio-Dynamic LF Series tablet feeders provide a chemical dose that is ideal for potable water and wastewater systems subject to high organic loading. Manufactured from ABS for durability and easy installation, integral inlet and outlet hubs accept four, six or eight inch piping. LF Series feeders are typically used for residential or small commercial onsite applications, stormwater treatment or remote potable water systems. Five different models are available to accommodate flows from 500 GPD through 400,000 GPD.

LF Series feeders range in length from 10 to 24½ inches, and 7 to 12 inches in width. The 22½ inch tall, one piece feed tubes are designed to fit inside standard 4” PVC piping, allowing all LF Series feeders to be surface installed or direct buried. For deeper installations, our optional remote feed tube removal system allows convenient feeder maintenance from grade.
The Series 2000 and Series 4000 tablet feeders provide precise chemical dosage with adjustable baffles, weirs or outlet sluice.

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

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

"Chlorine addition by tablet feeders is likely to be the most practical method for chlorine addition for onsite applications."
— USEPA Office of Research and Development, Onsite Wastewater Treatment Systems Manual TFS-21

maximize performance of water and wastewater treatment
Uniquely formulated Bio-Sanitizer® Disinfecting Tablets deliver consistent and inexpensive bacteria killing power

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

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

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

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

Norweco, Inc. warrants every new aerator, control center, Bio-Kinetic system, Singulair Green tank and any other Singulair component manufactured by Norweco to be free from defects in material and workmanship under normal use and service for a period of three years from the date of installation, as provided herein. Norweco will repair or replace the warranted component which in the sole judgement of Norweco shows evidence of manufacturing defect, provided that the defective component is returned to the factory, freight prepaid, by a licensed Singulair distributor, licensed service center or authorized dealer. This limited warranty shall be recognized in effect for three 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 three years from the date the warranted component was shipped from the factory.

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

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

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

© MMX NORWECO
SINGULAIR®

LIFETIME WARRANTY AND EXCHANGE PROGRAM

The Singulair aerator enjoys the distinction of being the only aerator on the market today backed by a lifetime exchange program. After the initial Singulair aerator three year warranty has expired, the owner is entitled to a lifetime of aerator protection with the exchange program.

Customers with a Singulair system may exchange any aerator, any age, for a replacement unit. The three year limited warranty starts over again on the replacement unit installation date. Norweco is proud to be able to offer a lifetime of protection to its Singulair customers. To qualify for the exchange program the conditions outlined below must be met.

Aerators can be accepted by Norweco for exchange if they are returned, freight prepaid, to our factory by a licensed Norweco Singulair distributor, licensed service center or authorized dealer. Collect shipments, or units returned directly from customers cannot be accepted. If aerator parts are missing or the aerator has been disassembled by unauthorized persons or tampered with in any way, it will be remanufactured on a time and materials basis rather than at a fixed exchange cost. Norweco cannot guarantee that the current exchange program will always be available, however, that is our goal, and we are happy to offer it at this time.

Singulair installations are also protected with an initial two year service program included in the cost of the system. A series of service and adjustment inspections by our local factory-trained personnel are prescheduled for the first two years of operation and included in the purchase price. “Progress through service since 1906” sums it up nicely. A quality product - serviced by a local expert - has earned Norweco a reputation for excellence.

Available only through Factory-Trained Distributors, Licensed Service Centers or Authorized Dealers

**Today’s Answer for the Protection of Tomorrow’s Environment**

<table>
<thead>
<tr>
<th>SYSTEM AGE</th>
<th>OWNER EXCHANGE</th>
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<tbody>
<tr>
<td>0-3 Years</td>
<td>In Warranty</td>
</tr>
<tr>
<td>3-5 Years</td>
<td>50 Percent</td>
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<tr>
<td>5-8 Years</td>
<td>60 Percent</td>
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<td>85 Percent</td>
</tr>
<tr>
<td>50 + Years</td>
<td>90 Percent</td>
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Norweco’s comprehensive exchange program offers Singulair owners a lifetime of protection. The chart below reflects the customer’s cost for a replacement Singulair aerator, as a percentage of the aerator list price in effect at the time of the exchange.

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</table>
The Service Pro ISC eliminates separate controls for individual wastewater treatment components. Designed for Singulair systems with a simplex effluent pump and up to three auxiliary inputs, the Service Pro ISC manages it all. Solid state construction provides precise monitoring and built-in surge suppression for all treatment components, protecting their operation and extending performance life. A user-friendly LCD screen simplifies programming for drip irrigation, spray irrigation, low pressure dose or any pumping option.

Each prewired control center integrates one 15 amp alarm breaker, one 15 amp aerator breaker, one 20 amp pump breaker, aerator and pump circuitry, electrical insulator, electrical current monitoring, visual and audible alarms, aerator timer, multifunction pump timer and LCD screen into a single, lockable NEMA 4X enclosure. Three pump timer options are built in: demand use, time of day and cycle operation. A terminal strip with individual connections for both the incoming power and all system components makes wiring safe and easy. One dedicated 20 amp, single-pole, 120 volt circuit breaker in the main electrical service panel is the only power source required for the entire system.

The LCD user interface can also be used to access historical operating and performance data for the system, such as aerator elapsed run time, aerator run cycles, pump elapsed run time, pump run cycles and system status – all guided by the LCD’s simple menus. Optional failsafe control features can be added to provide additional levels of process management. Three auxiliary alarm inputs are provided to monitor virtually any accessory component of the treatment system including UV disinfection systems, chemical feed systems and pump stations. Singulair Total Nitrogen Treatment (TNT) time cycle operation is available for systems installed in nitrogen sensitive areas.

- NEMA 4X enclosure
- Programmable aerator and pump operation
- Three programmable auxiliary inputs
- Low voltage circuitry to floats and auxiliary alarms for safe operation

The Service Pro Integrated System Control Center components have been listed, licensed and/or certified by each of the following agencies and organizations.

**norweco**

Engineering the future of water and wastewater treatment

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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.


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

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

(Continued on reverse)
Advantages

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

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tablet Size</td>
<td>2 5/8&quot; diameter, 1&quot; thick</td>
</tr>
<tr>
<td>Approx. Tablet Weight</td>
<td>5 oz. (140 grams)</td>
</tr>
<tr>
<td>Approx. Tablet Density</td>
<td>125 lbs./ft.³</td>
</tr>
<tr>
<td>Active Ingredient</td>
<td>Calcium Hypochlorite Ca (OCl)_2 • H₂O</td>
</tr>
<tr>
<td>Available Chlorine</td>
<td>70%</td>
</tr>
<tr>
<td>Inert Ingredients</td>
<td>30%</td>
</tr>
<tr>
<td>Appearance and odor</td>
<td>White tablet with blue crystals and mild chlorine odor</td>
</tr>
<tr>
<td>U.S.E.P.A. Registration</td>
<td>63243-4</td>
</tr>
</tbody>
</table>

Caution

Blue Crystal disinfecting tablets are a strong oxidizing agent and highly corrosive. Use or contact with oils, acids, petroleum products, reducing agents or other compounds, such as swimming pool tablets, is extremely dangerous - fire or explosion could result. Improper use of this product may cause personal injury or property damage. Tablets may be fatal if swallowed and tablet dust is irritating to the eyes, nose and throat. Keep out of the reach of children and do not allow tablets or feed tubes to contact skin, eyes or clothing. Do not handle the tablets or feed tubes without first contacting your local distributor and obtaining specific instructions for usage, handling and storage. Store only in sealed original container and in a well-ventilated area. Read the product container label carefully prior to use. It is unsafe and a violation of Federal law to use Blue Crystal disinfecting tablets in a manner inconsistent with its labeling.
Bio-Neutralizer dechlorination tablets are uniquely formulated to provide an efficient and cost-effective way of removing free and combined chlorine from the effluent of wastewater treatment systems. Scientifically blended to protect dissolved oxygen levels and to reduce wicking or swelling in the feed tubes, Bio-Neutralizer dechlorination tablets automatically maintain a flow-dependent application rate, up to intermittent peak flow factors of four. Optimum dechlorination rates are uniformly maintained even when the significant runoff period of the treatment system is six hours. When used in a Bio-Dynamic tablet feeder or other approved gravity flow tablet system, Bio-Neutralizer dechlorination tablets provide a stable and consistent release of environmentally safe sodium sulfite. A controlled dosage effectively reduces the chlorine residual to non-detectable levels while maintaining overall effluent quality.

High concentrations of residual sodium sulfite can degrade beneficial dissolved oxygen levels, increase BOD₅ and reduce overall effluent quality. The superior formulation and predictable performance of Bio-Neutralizer dechlorination tablets provides a consistent reduction or elimination of chlorine residual without significantly reducing dissolved oxygen. Packed in 25 lb. and 45 lb. DOT approved containers, Bio-Neutralizer dechlorination tablets are a preferred alternative to costly liquid, hazardous gas or mechanical dechlorination systems. Bio-Neutralizer dechlorination tablets, when used with Norweco’s Bio-Sanitizer disinfecting tablets or Blue Crystal residential disinfecting tablets, insure that only a stable, high quality effluent is returned to the environment. If your treatment system requires dechlorination or if you’re located near environmentally sensitive surface water and want to add a dechlorination system, consider the advantages of Norweco’s Bio-Neutralizer dechlorination tablets.
Advantages

- Environmentally safe
- Removes all chlorine to non-detectable levels
- Consistent sulfite dose
- Does not affect dissolved oxygen
- Beveled edge design minimizes wicking
- Non-hazardous when used as directed
- No mixing of chemicals or solutions

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<tr>
<td>Active Ingredient</td>
<td>Sodium Sulfite - (Na₂SO₃)</td>
</tr>
<tr>
<td>Active Ingredient%</td>
<td>35%</td>
</tr>
<tr>
<td>Inert Ingredients%</td>
<td>65%</td>
</tr>
<tr>
<td>Appearance and odor</td>
<td>Green tablet with mild odor</td>
</tr>
<tr>
<td>U.S.E.P.A. Designation</td>
<td>Non-Hazardous</td>
</tr>
</tbody>
</table>

Caution

Bio-Neutralizer dechlorination tablets are a strong reducing agent containing sodium sulfite. Direct contact with oxidizing agents such as Bio-Sanitizer disinfecting tablets, swimming pool tablets or any other chlorine containing compound is extremely dangerous. Water or wastewater being treated with Bio-Neutralizer dechlorination tablets should be at or near a neutral pH. If water or wastewater has an available chlorine level greater than 100 ppm or water temperature greater than 100°F, do not use any mixture containing sodium sulfite or other reducing agents. A reaction may occur which could generate heat and chlorine gas. This product should not be used to treat water intended for human consumption. Care must be taken in handling and storage. Store only in sealed original container and in a well-ventilated area. Read the product container label carefully prior to use. Keep out of the reach of children.
Bio-Perc®
Biological Remediation Tablets

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

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

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

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

Specifications

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

Caution

Bio-Perc biological remediation tablets are a proprietary, non-hazardous bacterial additive for wastewater treatment. Do not use this product in a manner inconsistent with its labeling. Do not contaminate food, feed or potable water with this product. Avoid contact with skin, eyes, mouth, respiratory system and clothing. Do not mix with acids or alkaline compounds. Use gloves and eye protection when handling tablets. Avoid inhalation of dust or vapors. Keep out of the reach of children. Extreme heat or extreme cold will affect product performance. Store only in sealed original container in a well-ventilated area. Do not handle Bio-Perc tablets or feed tubes without first contacting your local distributor and obtaining specific instructions for usage, handling and storage. Exercise care when removing tablets from container or filling feed tubes to prevent moisture contamination. Read the product container label carefully prior to use. Do not reuse empty container.
Bio-Gem is a patented blend of cultured bacteria, aggressive enzymes and natural growth accelerators developed to effectively digest grease, fats and oils in wastewater treatment systems, lift stations, sand filters, drain lines and grease traps. Regular use of Norweco’s Bio-Gem can reduce or eliminate costly line plugs, pump outs and municipal surcharges. Maintenance procedures that involve jetting of clogged lines or the use of harsh commercial degreasers often damage equipment and contaminate groundwater. Completely safe, effective and convenient to use, Norweco’s Bio-Gem is a natural way to eliminate grease, fats and oils throughout your treatment system.

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

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

(Continued on reverse)
Features

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

Specifications

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<tbody>
<tr>
<td>Bacteria Count</td>
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<tr>
<td>Appearance</td>
<td>Blue Liquid</td>
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<tr>
<td>Fragrance</td>
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<tr>
<td>Type</td>
<td>Aerobic and Anaerobic Pathways</td>
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<tr>
<td>Form</td>
<td>Spore</td>
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<tr>
<td>Gram-Positive</td>
<td>100% (Salmonella and Shigella Free)</td>
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<td>Standard Packaging</td>
<td>Gallon bottles</td>
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<td>(4-1 gallon bottles per case)</td>
</tr>
<tr>
<td>Shelf Life</td>
<td>2-4 years</td>
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</table>

Application and Dosage

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

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.

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 refrigerator 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 compositied 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 CBOD₅ (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.
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.” The type and quantity of samples collected should be determined by the data required. For example, the Code of Federal Regulations stipulates that the performance of secondary treatment systems should be evaluated by tabulating 30-day averages of system effluent. As it is impossible to judge long term treatment system performance by a single discrete grab sample, or even a single 24 hour composite sample, a 30-day regimen of proper samples must be collected, analyzed and tabulated before system performance can be evaluated.

It is wholly inaccurate, bad science and irresponsible to evaluate system performance by the analysis of data collected from one, or even several, effluent grab samples. The most widely used performance evaluation for residential treatment units (NSF/ANSI Standard 40) evaluates performance by tabulating data collected via composite sampling techniques. Each individual daily composite sample is collected over 24 hours by withdrawing an aliquot (a measured volume of sample) of effluent at 80 separate times throughout the day. If samples were collected every calendar day, each 30-day average applied to the pass/fail criteria would actually represent 2,400 individual sampling events, collected over an entire month.

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

SAMPLING PROCEDURES

Proper collection of an effluent sample, by either technique, requires specific procedures to be followed. A grab sample of effluent must be a free falling sample, collected from a cleaned effluent pipe, in a proper sample bottle, stabilized during transport, stored for a limited period of time and analyzed by specific laboratory methods. When using a composite sampler, follow the manufacturer’s instructions to insure an accurate, representative sample is collected. An automatic sampler may require withdrawing the sample from a pipe or channel that is cleaned daily. Samples should be collected “at points where the sample stream or tank is well mixed.” 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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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 BOD₅ and CBOD₅ 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.”
   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 cannot 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.
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 CBOD₅, 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.
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.”

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 can settle 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 CBOD₅ 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. In our mathematical model, we will assume that 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.

In our mathematical model, we will assume that due to the intermittent flow patterns of a residential treatment unit, 0.1% (0.001) of the total effluent suspended solids will settle out and accumulate while effluent passes through the sump. (While it is likely that a higher percentage of solids will settle out, especially during an overnight period of no flow, we will consider that on the average, only 1 out of each 1,000 effluent solids will settle out in the distribution box. Therefore, 999 out of every 1,000 effluent solids will stay in suspension and are carried out with the flow.) In this model, these parameters will remain in a steady state for six continuous months, corresponding to the period between service visits. After six months of operation, the sump in the bottom of the distribution box has accumulated 1 out of each 1,000 effluent solids that were contained in the 90,000 gallons of high quality effluent that has passed through the distribution box. If the contents of the sump in the bottom of the distribution box are then mixed, collected and analyzed as a grab sample, the data will show an effluent containing more than 700 mg/L of total suspended solids. This obviously erroneous data would seem to indicate that the effluent contains more suspended solids than typical residential influent flow. In reality, this treatment system is actually discharging an effluent of 10 mg/L total suspended solids. With this model, it is easy to understand that judging treatment system performance by dipping into any effluent sump and stirring the contents (effluent and accumulated solids) is totally invalid.

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

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

<table>
<thead>
<tr>
<th>EFFLUENT PARAMETER</th>
<th>MINIMUM SAMPLE SIZE</th>
<th>SAMPLE TYPE</th>
<th>PRESERVATION REQUIRED</th>
<th>MAXIMUM HOLDING TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbonaceous 5 Day Biochemical Oxygen Demand (CBOD₅)</td>
<td>1,000 mL</td>
<td>Composite</td>
<td>Refrigerate, 4°C</td>
<td>6 hrs./48 hrs.*</td>
</tr>
<tr>
<td>Total Suspended Solids (TSS)</td>
<td>200 mL</td>
<td>Composite</td>
<td>Refrigerate, 4°C</td>
<td>7 days</td>
</tr>
<tr>
<td>pH</td>
<td>50 mL</td>
<td>Grab</td>
<td>Analyze immediately</td>
<td>0.25 hrs.</td>
</tr>
<tr>
<td>Dissolved Oxygen</td>
<td>300 mL</td>
<td>Grab</td>
<td>Analyze immediately</td>
<td>0.25 hrs.</td>
</tr>
<tr>
<td>Temperature</td>
<td>N/A</td>
<td>Grab</td>
<td>Analyze immediately</td>
<td>0.25 hrs.</td>
</tr>
<tr>
<td>Total Residual Chlorine</td>
<td>500 mL</td>
<td>Grab</td>
<td>Analyze immediately</td>
<td>0.25 hrs.</td>
</tr>
<tr>
<td>Ammonia Nitrogen</td>
<td>500 mL</td>
<td>Composite</td>
<td>Analyze as soon as possible or add H₂SO₄ to pH &lt;2, refrigerate</td>
<td>7 days/28 days*</td>
</tr>
<tr>
<td>Nitrate Nitrogen</td>
<td>100 mL</td>
<td>Composite</td>
<td>Analyze as soon as possible, refrigerate</td>
<td>48 hrs. (28 days for chlorinated samples)</td>
</tr>
<tr>
<td>Total Kjeldahl Nitrogen (TKN)</td>
<td>500 mL</td>
<td>Composite</td>
<td>Add H₂SO₄ to pH &lt;2, refrigerate</td>
<td>7 days/28 days*</td>
</tr>
<tr>
<td>Oil &amp; Grease</td>
<td>1,000 mL</td>
<td>Grab</td>
<td>Add H₂SO₄ to pH &lt;2, refrigerate</td>
<td>28 days</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>100 mL</td>
<td>Composite</td>
<td>Add H₂SO₄ to pH &lt;2, refrigerate</td>
<td>28 days</td>
</tr>
<tr>
<td>Fecal Coliform</td>
<td>N/A</td>
<td>Grab</td>
<td>Add 0.008% Na₂S₂O₅**, cool to 4°C. All collection utensils and techniques must be sterile</td>
<td>6 hrs.</td>
</tr>
</tbody>
</table>

*First value is maximum storage time recommended by “Standard Methods.” Second value is maximum holding time allowed by Code of Federal Regulations⁴, 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

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

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

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

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

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

1. In the case of a septic tank or pretreatment tank, gravity separation of solids is greatly enhanced. This prevents short-circuiting and eliminates excess solids from being carried downstream into the secondary treatment facility or disposal system.

2. When a secondary biological or chemical treatment system is used, elimination of hydraulic surges guarantees adequate process retention time and a much higher degree of treatment.

3. Clarifiers following secondary treatment will have greater solids separation and improved effluent quality. If an internal filtration device is used, solids loading to the filtration device will be reduced, resulting in longer filter life and higher effluent quality.

4. The operation of a downstream sand filter, media filter or constructed wetland is enhanced by more consistent loading, the equalization of surge flows and the removal of excess solids.

5. All types of effluent disposal systems, including tile fields, mounds, irrigation systems, etc., will operate longer and more efficiently because organic and hydraulic surges are eliminated and system overloading is prevented.
FLOW EQUALIZATION FOR WASTEWATER TREATMENT SYSTEMS (Cont.)

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

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

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

The above chart clearly demonstrates the important role flow equalization plays in wastewater treatment. Incorporating flow equalization into residential onsite treatment systems makes any system perform better and prevents premature failure. Hydraulic surges are produced in the home every day through the combined use of bathtubs, dishwashers, disposals, clothes washers, shower facilities and a variety of other water using appliances. When these surges occur, a residential treatment system without flow equalization is compromised and often will not provide adequate treatment. Flow equalization allows commercial, municipal, industrial and residential wastewater systems to deliver the treatment they were designed to provide.
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, and if required, chlorination and dechlorination of the effluent prior to discharge. All treatment processes shall be contained within reinforced precast concrete tankage meeting the requirements of ACI Standard 318. The wastewater treatment system shall be a Singulair Model 960 as manufactured by Norweco, Inc., Norwalk, Ohio, USA.

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 coupling 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 electrical control center with MCD technology, Bio-Static sludge return and Bio-Kinetic tertiary treatment device for flow equalization and final filtration of system effluent.
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 four 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.

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, NEMA6 rated electrical connector, UL recognized 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 without UL recognition have not demonstrated compliance with international electrical standards for safety and reliability and shall not be considered for this application.
The Service Pro electrical 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 a time clock, 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 and 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.

**TIME CLOCK**

The aerator run cycle shall be controlled by an adjustable, pre-wired time clock. The minimum setting shall not permit the aerator to be "off" for more than 30 minutes per hour. It shall be adjustable in 5 minute increments and designed such that any adjustment results in additional run time up to "continuous" operation (60 minutes per hour). Use of a time clock can seriously affect system performance and operating cost. Systems that have not been performance certified at the minimum time clock setting by an independent testing laboratory shall not be considered for this application.

**SERVICE PRO® MONITORING CENTER**

The Service Pro monitoring center shall include a 128 bit encrypted password protected website for interface with the monitoring center database. Access to the secure website shall be obtained through a unique user name and password that provides tiered access to data from monitored treatment systems. Access level tiers shall include distributors, service providers, regulatory agencies and individual system owners. Distributors and service providers shall be able to create accounts, 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 operating in geographically isolated locations.
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, optional chlorination feed tube, un baffled 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, optional dechlorination feed tube, outlet zone and gasketed discharge flange. All components shall be manufactured from inert synthetic materials or rubber, assembled in circular fashion and connected to a 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. Optional Blue Crystal and Bio-Neutralizer tablet feed tubes shall be positioned such that the flow-activated chemical cannot make contact with the liquid upstream of the feed tubes.

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 600 gallon per day NSF Standard 40 design loading schedule, minimum performance of the device shall equalize daily flow an average of 50%.

BLUE CRYSTAL® CHLORINATION SYSTEM (Optional)

The Singulair system shall be furnished complete with a tablet feeder and a six month supply of Blue Crystal disinfecting tablets. Blue Crystal tablets shall be specifically formulated for consistent chlorine dosage and effluent disinfection to the sustained, variable and intermittent flows that are typical of domestic wastewater treatment systems. The tablets shall be manufactured from pure calcium hypochlorite and contain a minimum of 70% available chlorine. Each tablet shall be 2½₈” diameter, compressed to a 1” thickness, weigh approximately 5 ounces and be white in color with blue crystals for easy identification. The tablets shall dissolve in direct proportion to the flow rate, releasing controlled amounts of chlorine.

BIO-NEUTRALIZER® DECHLORINATION SYSTEM (Optional)

The Singulair system shall be furnished complete with a tablet feeder and a six month supply of Bio-Neutralizer dechlorination tablets. The dechlorination tablets shall contain active ingredients specially formulated to chemically neutralize both free and combined chlorine. Each tablet shall be 2½₈” diameter, compressed to a 13/16” thickness, weigh approximately 5 ounces and be green in color for easy identification. The tablets shall dissolve slowly, releasing controlled amounts of chemical for the instantaneous removal of residual chlorine from the system effluent.
WARRANTY AND EXCHANGE PROGRAM

The manufacturer shall provide a three year limited warranty for each Singulair aerator, Service Pro control center and Bio-Kinetic system purchased from the manufacturer. A comprehensive exchange program offers Singulair owners a lifetime 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 960 DATA CHART

<table>
<thead>
<tr>
<th>Designation: Model 960-</th>
<th>500 GPD</th>
<th>750 GPD</th>
<th>1000 GPD</th>
<th>1250 GPD</th>
<th>1500 GPD</th>
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<tr>
<td>Daily Treatment Capacity (Gallons Per Day)</td>
<td>500/600</td>
<td>750/800</td>
<td>1000</td>
<td>1250</td>
<td>1500</td>
</tr>
<tr>
<td>Total System Capacity (Gallons)</td>
<td>1300</td>
<td>1600</td>
<td>2300</td>
<td>2850</td>
<td>3400</td>
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<td>Number of Singulair Aerators</td>
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<td>2</td>
<td>2</td>
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<tr>
<td>Number of Bio-Kinetic Systems</td>
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<td>3</td>
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<td>Drawing Number (PC-5-)</td>
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**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 960 system averaged effluent of 6 mg/L CBOD and 10 mg/L TSS. 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

Prewired controls are supplied in a sealed NEMA rated enclosure for your safety and the protection of components and wiring. The controls should be located so the alarm light can be seen and the audible alarm heard, while minimizing exposure to harsh weather or conditions that might prevent routine access. If an issue with the aerator is detected, the red alarm light will flash and the control center will attempt to restart the aerator every five minutes for two hours. For an open motor or under current condition, the alarm light will display two short flashes followed by a pause. For an over current condition, the alarm light will flash evenly. If the aerator does not restart after two hours, the audible alarm will sound. To silence the audible alarm and attempt to restart the aerator, push the reset button. If the alarm condition is not resolved, the audible alarm will be silenced for 48 hours, but the alarm light will continue to flash. In this case, contact your service provider. Model 960 systems are supplied with a time clock adjustable in five minute increments up to continuous run. This clock is factory preset to run 30 minutes per hour and should only be adjusted by an authorized Singulair service provider. Model TNT systems are supplied with a non-adjustable time clock.

SERVICE PRO® MONITORING CENTER

An optional Service Pro MCD control center is available for use with the Singulair system. Designed to connect to a standard telephone line or internet connection, this control center provides MONITORING, COMPLIANCE and DIAGNOSTIC functions complete with telemetry for communication with the Service Pro monitoring center. Once your Service Pro MCD control center is connected to a telephone line or internet connection, commissioned, and covered by a remote monitoring agreement, your service provider will be immediately notified of any alarm condition. The Service Pro monitoring center will automatically log the time and date of alarm conditions, as well as service performed, and store them in your system history record for viewing at www.servicepromcd.com.

NOTE: The control center regularly communicates with the Service Pro monitoring center using your telephone line or an internet connection. If the control center is using the telephone line when you attempt to place a call, a high pitched digital communication signal will be heard. Hang up all telephones sharing the line and wait a few seconds. This will automatically disconnect the control center and make the line available for use.

BIO-STATIC® SLUDGE RETURN

Each Bio-Static sludge return is installed in the aeration/clarification chamber wall. Aeration chamber hydraulic currents enter the sludge return(s) and transfer solids from the clarification chamber 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.

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, optional chlorination and dechlorination tablet feed systems and serves as its own chlorine contact chamber. When used with Blue Crystal disinfecting tablets, the performance of the Bio-Kinetic system as a chlorination device is certified to NSF/ANSI Standard 46, Section 11. All components are manufactured from plastic or rubber. 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.

NOTE: The control center regularly communicates with the Service Pro monitoring center using your telephone line or an internet connection. If the control center is using the telephone line when you attempt to place a call, a high pitched digital communication signal will be heard. Hang up all telephones sharing the line and wait a few seconds. This will automatically disconnect the control center and make the line available for use.
NON-MECHANICAL FLOW EQUALIZATION

The 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 equals 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.

BLUE CRYSTAL® RESIDENTIAL DISINFECTING TABLETS

If local regulations require, an initial supply of Blue Crystal disinfecting tablets will be placed in the Bio-Kinetic system chlorine feed tube(s) at system start-up. Specifically formulated for use in the Singulair system, Blue Crystal disinfecting tablets provide efficient and reliable disinfection when effluent chlorination is desirable. Manufactured from calcium hypochlorite, Blue Crystal disinfecting tablets provide effective, economical bacteria killing power. Liquid entering the Bio-Kinetic system contacts the installed Blue Crystal disinfecting tablets, just downstream of the equalization ports. A fully charged feed tube will last an average of six months. During each semi-annual inspection, your Singulair service provider will check system operation, the rate of tablet consumption and install tablets during routine service inspections.

NOTE: USEPA guidelines state “On the average, satisfactory disinfection of secondary wastewater effluent can be obtained when the chlorine residual is 0.5 ppm after 15 minutes contact.” Retention time must comply with the controlling regulatory jurisdiction.

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

BIO-NEUTRALIZER® DECHLORINATION TABLETS

In environmentally sensitive areas, environmental regulations may require the use of Bio-Neutralizer dechlorination tablets. Manufactured as an efficient and dependable means to chemically neutralize both free and combined chlorine, Bio-Neutralizer dechlorination tablets provide consistent reduction or elimination of chlorine residual without unnecessarily reducing the level of dissolved oxygen in the treatment system effluent. Bio-Neutralizer dechlorination tablets utilize a unique chemical mixture for chlorine reduction and environmental protection. As liquid passes through the final discharge zone of the Bio-Kinetic system, the flow contacts the installed Bio-Neutralizer tablets and residual chlorine is removed from the system effluent. A fully charged Bio-Neutralizer feed tube will last an average of six months. During each semi-annual inspection, your Singulair service provider will check system operation, the rate of tablet consumption and install tablets during routine service inspections.

CAUTION: Bio-Neutralizer tablets or feed tubes should not be mixed with Blue Crystal tablets. Do not handle the tablets or feed tubes without first carefully reading the product container label, MSDS information and the handling and storage instructions. For additional information about Bio-Neutralizer tablets contact your Singulair service provider.

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.
SINGULAR® 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 Product 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.

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
- Fill Blue Crystal feed tube
- Fill Bio-Neutralizer feed tube
- 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 included with the Model 206C aerator 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 three year limited warranty and lifetime aerator exchange program will begin on the date of component shipment from the factory.

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

SINGULAIR® LIMITED WARRANTY

The Singulair aerator enjoys the distinction of being the only aerator on the market today backed by a lifetime 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 three years from the date of purchase. The three year limited warranty is included in the original purchase price of every Singulair system. The comprehensive aerator exchange program offers Singulair owners a lifetime of protection. Owners with a Singulair system may exchange any aerator of any age for a replacement unit at a prorated cost. If the Singulair aerator or Service Pro control center 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:

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FAX (419) 663-5440
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GENERAL SPECIFICATIONS

The contractor shall furnish and install one complete Service Pro control center with MCD technology as described in the following specifications. Monitoring, Compliance and Diagnostic (MCD) functions for the domestic wastewater treatment system and auxiliary equipment shall be accomplished by combining solid state microprocessor technology with optional advanced telemetry and web-based data acquisition. The control center shall operate the Singulair wastewater treatment plant and monitor the entire system, including up to three auxiliary treatment components. Once commissioned, the telemetry system shall communicate with the Service Pro website and monitoring center to record all maintenance and alarm details. The website shall function as the user interface to manage all operational data with password protected access available to distributors, service providers, regulatory agencies and homeowners.

OPERATING CONDITIONS

The Service Pro control center with MCD technology shall be UL Listed and provide Monitoring, Compliance and Diagnostic functions for the Singulair wastewater treatment plant and auxiliary equipment using a microprocessor based platform. The microprocessor shall contain nonvolatile memory to prevent loss of programming in the event of a power failure. When used with the Singulair Model 960 system, the programmed run cycle shall not permit the aerator to be “off” for more than thirty minutes per hour. When used with the Singulair Model TNT system, the programmed run cycle for the aerator shall be sixty minutes “on” and sixty minutes “off.” The control center shall be housed in a NEMA rated electrical enclosure designed specifically for outdoor use. Control centers that do not include integral telemetry equipment require multiple enclosures with interconnecting wiring and shall not be considered for this application.
MONITORING FUNCTIONS

The Service Pro control center shall monitor the operation of the Singulair system and up to three auxiliary treatment components. The performance of the Singulair aerator shall be constantly monitored to detect any aerator over current, aerator under current or open motor condition. If any one of these conditions is detected, power to the aerator shall be interrupted, a diagnostic sequence shall begin and the visual alarm shall activate. After a factory programmed recovery interval, an automatic restart attempt shall be initiated. If normal aerator operation does not resume during 24 programmed recovery and restart cycles, the audible alarm shall activate and, if the telemetry system has been enabled, the control center shall report the specific condition to the Service Pro monitoring center. In the event that any of the auxiliary inputs detect an operational problem, the audible and visual alarms shall immediately activate and, if the telemetry system has been enabled, the control center shall report the specific alarm condition to the monitoring center. The distributor shall be automatically notified by the Service Pro monitoring center of the specific alarm condition using phone, fax or email.

COMPLIANCE FUNCTIONS

The Service Pro control center shall insure compliance with regulatory requirements by confirming normal system operation, providing remote system monitoring and automatically recording operating data and service visits. Distributors shall have the ability to grant regulatory agencies access to reports about installations in their jurisdiction that have been recorded on the Service Pro website. The optional integrated telemetry system shall enable the Service Pro control center to communicate with the monitoring center via standard residential telephone or Internet service. By use of the alarm reset button, the monitoring center shall be notified of the beginning and end of any service visit. The monitoring center shall provide a time and date stamped record of each service visit and post the data to the Service Pro website. If telemetry is enabled, the control panel shall automatically contact the monitoring center monthly and deliver a heartbeat call indicating proper system operation. If the heartbeat call is not received, the monitoring center shall provide notification to the service provider indicating the system has not confirmed proper operation and a site visit is required. Control centers and/or telemetry systems without the heartbeat feature do not provide proactive confirmation of system compliance and shall not be considered for this application.

DIAGNOSTIC FUNCTIONS

The diagnostic functions of the Service Pro panel shall insure automatic identification of any alarm condition from the Singulair system or accessory equipment. Excessive load on the aerator from any cause, including effluent pump failure, a Bio-Kinetic system requiring service or system high water, shall result in the control center visual alarm indicating an aerator over current condition. An open electrical circuit anywhere in the control center or aerator, a broken service line between the control center and the aerator, open motor windings within the aerator or an aerator that has been left unplugged shall activate the visual alarm indicating an aerator under current condition. Any aerator alarm condition shall activate the diagnostic sequence during which the control center shall allow for a temporary condition to correct itself before a call is made to the remote monitoring center. The diagnostic sequence shall include up to 24 automatic restart attempts within a two hour period. During this diagnostic period when the control center is attempting to automatically restart the Singulair aerator, pushing the reset button shall result in a manual restart attempt. Any successful restart attempt shall return the system to normal operation and the visual alarm shall deactivate. If the condition has not been corrected after 24 manual or automatic restart attempts, the control center shall activate the audible alarm and, if the telemetry system has been enabled, notify the monitoring center of the specific alarm code. Any auxiliary equipment malfunction shall immediately activate the control center audible and visual alarms. If enabled, the telemetry system shall then call the monitoring center to identify the specific auxiliary alarm.
CONTROL CENTER COMPONENTS

The Service Pro control center shall use a microprocessor based platform to control and monitor the wastewater treatment system. Nonvolatile memory built into the solid state circuit board shall prevent programming loss in the event of a power failure to the facility being served. The pre-wired controls shall be mounted in a lockable NEMA rated enclosure designed specifically for outdoor use. The corrosion resistant enclosure shall have knockouts molded into the bottom surface to facilitate installation of electrical conduit and the system phone or network line. Each control center shall be a UL Listed assembly and shall include a time clock, main alarm light, reset button, power switch, power light, phone/network light, aerator alarm light and three auxiliary alarm lights. The power switch shall control power for all Service Pro control center and aerator functions. The green power light shall be lit when the controls are energized and is the only light that will be illuminated during normal system operation. The yellow phone/network light shall be illuminated when the telemetry system is communicating. The red aerator alarm light shall be illuminated when normal operation of the aerator has been interrupted. The red auxiliary input lights shall illuminate only when the respective optional device requires service. The main alarm circuit of the Service Pro control center shall contain both visual and audible alarms and a reset button. Both the audible and visual alarms shall comply with the requirements of NSF/ANSI Standard 40 and Standard 245 regarding visual and audible signaling equipment. The main alarm light shall be visible through the closed door of the enclosure via a red weatherproof lens. When activated by either an aerator or auxiliary alarm, the main alarm light shall flash a programmed pattern to indicate the specific alarm condition. The reset button shall be centrally located on the control center and accessible from outside the enclosure via a weatherproof boot. Pressing the reset button shall cause a manual restart attempt of the aerator and re-initiate the programmed run cycle. If the audible alarm has been activated, pressing the reset button shall silence the alarm. The visual alarm shall remain active during the time the audible alarm is silenced. If the alarm condition has not been corrected after 48 hours, the audible alarm will reactivate. If telemetry is enabled, the control panel shall automatically call the Service Pro monitoring center. Data transmitted by the control center shall be received by the monitoring center and recorded in the database maintained via the Service Pro website. The monitoring center shall automatically notify the distributor or service provider when a Service Pro panel reports an alarm condition or fails to initiate a monthly heartbeat call.

MODEL 960 SYSTEM OPERATION

When a Service Pro control center is used with the Model 960 Singulair system, the aerator run cycle shall be controlled by an adjustable, pre-wired time clock. The minimum setting shall not permit the aerator to be “off” for more than 30 minutes per hour. The time clock shall be adjustable in 5 minute increments and designed so that any adjustment results in additional run time up to “continuous” operation (60 minutes per hour). Use of a time clock can seriously affect system performance and operating cost. Systems that have not been performance certified at the minimum time clock setting by an independent testing laboratory shall not be considered for this application.

MODEL TNT SYSTEM OPERATION

The Service Pro control center supplied with the Model TNT Singulair system shall be equipped with a factory programmed timer that controls aerator operation. The non-adjustable timer shall create a 60 minute aeration cycle followed by a 60 minute anoxic cycle during which the aerator shall be “off”. A total of twelve hours of aerator operation per day shall be provided.
AUXILIARY ALARMS

The Service Pro control center shall contain three auxiliary alarm inputs to monitor accessory components. Each auxiliary input shall allow connection to a voltage signal, normally open relay contacts or normally closed relay contacts, using the appropriate input terminals and jumpers. The voltage input connections are located along the left edge of the circuit board and shall automatically adjust to accept any input voltage from 5 to 120 VAC/DC without programming or jumper adjustment. The relay input connections are located along the top edge of the circuit board and shall be configured for normally open (O) or normally closed (C) relay contacts by placing jumpers over the appropriate pins (labeled JP7, JP8 and JP9). Any auxiliary alarm signal shall activate that specific auxiliary alarm light and the main alarm light, sound the audible alarm and call the remote monitoring center if the telemetry function is enabled. Once connected to the remote monitoring center, the control center shall identify which auxiliary alarm has been activated. Each auxiliary input shall be labeled in the space provided on the control center insert using the factory-supplied preprinted labels. The auxiliary inputs shall be used to monitor wastewater treatment equipment only. Connection of household appliances, security systems or other unauthorized equipment is prohibited and shall void the limited warranty.

TELEMETRY FUNCTIONS (Optional)

Optional integrated telemetry shall permit interactive communication between the monitoring center and the Singulair system, including all auxiliary equipment. The panel shall be factory programmed to contact the Service Pro monitoring center where the database of specific system information and a call record is maintained. The control center shall be shipped from the factory with the telemetry function disabled. Following panel installation and execution of the remote monitoring agreement, a commissioning process shall activate the telemetry function and establish communications with the Service Pro monitoring center via a toll-free telephone number or Internet connection. During normal operations, the heartbeat feature shall initiate a communication to the monitoring center at monthly intervals. The panel shall also contact the monitoring center to report alarm conditions. During each communication, the control center shall identify the individual installation and deliver the operational status or specific alarm code. The panel shall confirm receipt of the message before ending the communication. If not confirmed, the panel shall repeat until successful. The telemetry system shall have the ability to share a phone line or Internet connection with the facility being served. A dedicated telephone line or Internet connection shall not be required. If a telephone line is utilized, the panel shall automatically check phone line availability before initiating a call. If the phone line is not available, the system shall check every five minutes until the line becomes clear. When a clear line is available, the panel shall connect with the monitoring center. If the telemetry system is in the process of communicating and the telephone is picked up, the telemetry system shall immediately disconnect. The telephone shall be available for use after the person attempting to initiate a call momentarily hangs up to clear the phone line. The panel shall continue to monitor use of the telephone line. When the control center detects the telephone line is available for use, the telemetry system shall repeat the interrupted communication to the remote monitoring center.
SERVICE PRO® MONITORING CENTER

The Service Pro monitoring center shall include a 128 bit encrypted, password protected website for interface with the database of wastewater treatment system information. Access to the secure website shall be obtained through a unique user name and password that gives users tiered access to data from the wastewater treatment systems being monitored. Access levels shall include distributors, service providers, local regulatory agencies, state 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 website. Individual system owners shall be able to view information regarding their own systems, as well as download instructional information. The monitoring center database shall contain the following information for each system registered: owner’s name and system address, aerator serial number, control center serial number, system model number(s), auxiliary alarm information, accessory equipment information, permit information, service contract information, account status, service history and complete alarm history. Access to all wastewater treatment system information shall be password protected and limited exclusively to distributors, service providers, regulatory agencies and system owners. Integrity of stored data shall be maintained through the use of multiple servers operating in geographically isolated locations.

COMMISSIONING PROCESS

The Service Pro control center shall be programmed to initiate communications with the website and remote monitoring center via the commissioning process. Commissioning shall typically be initiated at Singulair system start-up and shall require no special tools or electronic equipment. The colored indicator lights on the face of the control center insert shall be used to confirm each step through the commissioning process. The Service Pro telemetry system shall send a communication to the monitoring center identifying the control panel and indicating that telemetry features have been enabled. If the control center has been correctly commissioned, the red alarm light in the center of the Service Pro panel shall flash five times and then turn off. If commissioning is not performed, the telemetry features shall remain disabled, but all Singulair wastewater treatment system operating controls and diagnostic features shall be fully functional.

SERVICE MANAGEMENT MODULE

All routine and emergency service shall be managed by the Service Pro monitoring center and shall be accessible through the password protected website. Systems where the telemetry functions are not activated shall be managed by manual entries into the website. When a Singulair installation is registered, the service frequency for the system shall be entered into the database. An online report shall constantly notify distributors and service providers of the systems that are due for service in the next 90 days, including both warranty and extended service contract inspections. All systems with service contracts expiring within the next 90 days in a given geographic area also shall be posted to an online report. Any system in the area that is currently experiencing an alarm condition shall be posted and viewable by the distributor and service provider. Distributors shall have the ability to grant regulatory officials access to system reports. These reports shall improve maintenance efficiency by allowing all service visits and installation inspections to be scheduled by date and grouped by physical proximity.

When service to the Singulair wastewater treatment system is performed, the date and time of the service visit as reported by the Service Pro telemetry system shall be posted on the website. If the telemetry system has not been commissioned, the website shall have the ability to receive manually entered service reports and post them with all inspection and compliance information. Manually completed service reports shall be automatically incorporated into the Service Pro website for electronic tracking. The service reports shall specify the inspection date, service performed and the condition of all equipment, including the Singulair aerator, Bio-Kinetic system, control center, optional disinfection system and effluent disposal system.
CERTIFICATION AND TESTING

The Service Pro control center shall be certified by internationally accredited, independent testing laboratories to verify product safety and performance. The control center shall meet the requirements of Underwriter’s Laboratory (UL) Standard 508 and the Canadian Standards Association (CSA) Standard CAN/CSA-C22.2 No. 68-92 (R2004). The telemetry equipment shall be licensed by the Federal Communications Commission (FCC) under Standard 68. The circuit board shall be tested by an independent agency for certification and approval to ANSI C62-41 for 320 joules of intermittent electrical surge protection. The Service Pro control center shall be tested by an independent third party laboratory for electromagnetic compatibility per European Standard EN61000-6-1, including radiated and conducted radio frequency testing, electrostatic discharge testing and fast burst transient testing. To prevent corrosion from humidity or potentially harmful gasses associated with the treatment of domestic wastewater, the completed circuit board shall be conformal coated with a UL Recognized acrylic resin meeting military specification MIL-46058C.

The Service Pro control center shall be listed by NSF International and CSA for compliance with all applicable standards. The enclosure for the control center shall be certified as complying with NEMA standards for outdoor rated electrical enclosures. The current sensing circuit of the control center shall be tested to maintain accuracy to within 5% of the design parameters when operated in ambient temperatures from -20° to 160° Fahrenheit. The control center shall meet the requirements of NSF/ANSI Standard 40 and Standard 245 for use with Singulair wastewater treatment systems, including performance testing of the audible and visual alarms. Control centers not complying with applicable standards, certifications and testing have not been proven suitable for long term use and shall not be considered for this application.

WARRANTY PROGRAM

The manufacturer shall provide a three year limited warranty against defects in material and workmanship under normal use and service for each Service Pro control center with MCD technology. The warranty shall also cover any other Singulair components purchased from the manufacturer. The Singulair distributor shall provide warranty 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.

PROGRESS THROUGH SERVICE SINCE 1906
GENERAL SPECIFICATIONS

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

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

EQUIPMENT MANUFACTURER

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

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

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

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

INLET HUB AND BAFaffle

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

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

STATIONARY INSERT

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

CHEMICAL FEED TUBES

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

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

**FIXED WEIR**

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

HYDRODYNAMIC MIXING CHAMBER AND OUTLET HUB

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

ACCESS RISERS

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

BIO-DYNAMIC® TABLET FEEDER DATA CHART

<table>
<thead>
<tr>
<th>Model</th>
<th>Inlet/Outlet Diameter</th>
<th>Minimum Flow (GPD)</th>
<th>Design Flow (GPD)</th>
<th>Maximum Flow (GPD)</th>
<th>Number of Tubes</th>
<th>Fixed Weir</th>
<th>Adjustable Sluice</th>
<th>Drawing Number</th>
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</thead>
<tbody>
<tr>
<td>XT 2000 (S)</td>
<td>4&quot;</td>
<td>200</td>
<td>20,000</td>
<td>100,000</td>
<td>2</td>
<td>Standard</td>
<td>Optional</td>
<td>PC-5-9501</td>
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<tr>
<td>IT 2000 (S)</td>
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<td>Not Available</td>
<td>Standard</td>
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<tr>
<td>XT 4000 (S)</td>
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<td>20,000</td>
<td>50,000</td>
<td>200,000</td>
<td>4</td>
<td>Standard</td>
<td>Optional</td>
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<td>4</td>
<td>Not Available</td>
<td>Standard</td>
<td>PC-5-9505</td>
</tr>
</tbody>
</table>

REMOTE FEED TUBE REMOVAL SYSTEM

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

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

BIO-NEUTRALIZER® DECHLORINATION TABLETS

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

LIMITED WARRANTY

The manufacturer shall provide a limited warranty against defects in material and workmanship under normal use and service for a period of ten years. The distributor shall provide a detailed copy of the warranty to the regulatory agency, contractor and customer as required.
WASTEWATER MANAGEMENT SYSTEM
MODEL BK 2000

GENERAL SPECIFICATIONS

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

OPERATING CONDITIONS

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

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

EXTENSION RISERS

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

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

NON-MECHANICAL FLOW EQUALIZATION

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

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

BIO-NEUTRALIZER® DECHLORINATION SYSTEM

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

TEN YEAR LIMITED WARRANTY

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

EQUIPMENT MANUFACTURER

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

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

TABLET PROPERTIES AND USAGE

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

PRODUCT APPLICATION

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

DESIGN DATA

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Tablet Size</td>
<td>2 5/8&quot; diameter, 1&quot; thick</td>
</tr>
<tr>
<td>Approximate Tablet Weight</td>
<td>5 oz. (140 grams)</td>
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<tr>
<td>Active Ingredient</td>
<td>73% Calcium Hypochlorite – Ca(OCl)₂ • H₂O</td>
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<tr>
<td>Minimum Available Chlorine</td>
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<td>Appearance Characteristics</td>
<td>White Tablet with Blue Crystals</td>
</tr>
<tr>
<td>Special Design Features</td>
<td>Beveled Edges</td>
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</tbody>
</table>

SPECIAL INSTRUCTIONS

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

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

SAFETY INSTRUCTIONS

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

TABLET HANDLING

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

FEED TUBE LOADING INSTRUCTIONS

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

CAUTION

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

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

FIRST AID INSTRUCTIONS

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

TRADE NAME Blue Crystal®
CHEMICAL NAME Calcium Hypochlorite,
Hydrated, Tablets
CHEMICAL ABSTRACT SERVICE NO. CAS #7778-54-3
CHEMICAL FAMILY Hypochlorite
FORMULA Ca (OCI) 2
U.S. DOT SHIPPING NAME Calcium Hypochlorite, Hydrated
U.S. DOT HAZARD CLASS 5.1 Oxidizer
IDENTIFICATION NUMBER UN 2880
PACKING GROUP II
REPORTABLE QUANTITY 10 pounds/4.5 Kg.
HMIS/NFPA RATING 3/0/1
I.M.O. DESCRIPTION
CALCIUM HYPOCHLORITE (70% Available Chlorine) 73%
INERT INGREDIENTS (includes 5.5-10% Moisture and colorant) 27%

II. INGREDIENTS

CALCIUM HYPOCHLORITE (70% Available Chlorine) 73%
APPEARANCE AND ODOR White with Blue Crystals and Chlorine Odor
VOLUME % VOLATILE Not Applicable

III. PHYSICAL DATA

BOILING POINT AT 760 mm Hg Decomposes at 180° C
SPECIFIC GRAVITY OF TABLET 1.94 (H2O = 1)
PH OF SOLUTION Alkaline
APPEARANCE AND ODOR White with Blue Crystals and Chlorine Odor
SOLUBILITY IN H2O, % BY WEIGHT 217 g/l at 27° C
APPROXIMATE BULK DENSITY 61 lbs./ft3
HEAT OF SOLUTION Slightly Exothermic
VOLUME % VOLATILE Not Applicable

IV. FIRE AND EXPLOSION DATA

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

V. HEALTH HAZARD DATA

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

VI. EFFECTS OF OVEREXPOSURE

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

VII. EMERGENCY AND FIRST AID PROCEDURES

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

VIII. REACTIVITY DATA

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

IX. SPILL AND LEAK PROCEDURE

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

X. SPECIAL PROTECTION INFORMATION

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

THIS MATERIAL SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION. NORWALK WASTEWATER EQUIPMENT COMPANY PROVIDES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, AND ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE DATA CONTAINED HEREIN.
ADDITIONAL CHEMICAL PRODUCTS FROM NORWECO

BIO-DYNAMIC® TABLET FEEDERS

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

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

BIO-SANITIZER® DISINFECTING TABLETS

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

BIO-NEUTRALIZER® DECHLORINATION TABLETS

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

DISTRIBUTED LOCALLY BY:


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GENERAL SPECIFICATIONS

Bio-Neutralizer dechlorination tablets shall be formulated and produced to chemically neutralize both free and combined chlorine in water, wastewater and process water treatment systems. Bio-Neutralizer tablets shall be engineered to dissolve slowly and evenly, maintaining effluent quality without any loss of dissolved oxygen or increase in BOD₅. The tablets shall be 2\(\frac{3}{8}\)" diameter, compressed to 1\(\frac{3}{16}\)" thickness with an approximate weight of 5 oz. and incorporate beveled edges to stabilize chemical release and to minimize maintenance requirements. Sulfur dioxide gas or liquid sodium metabisulfite systems create serious health hazards and handling concerns and therefore shall not be considered for this application.

TABLET PROPERTIES AND USAGE

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

PRODUCT APPLICATION

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

DESIGN DATA

Tablet Size 2\(\frac{3}{8}\)" diameter, 1\(\frac{3}{16}\)" thick
Approximate Tablet Weight 5 oz. (140 grams)
Active Ingredient Sodium Sulfite – Na₂SO₃
Active Ingredient Content 35%
Inert Ingredient Content 65%
U.S. DOT Hazard Class Non-hazardous
Appearance Characteristics Green Tablet with Mild Odor
Special Design Features Beveled Edges

SPECIAL INSTRUCTIONS

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

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

SAFETY INSTRUCTIONS

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

TABLET HANDLING

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

FEED TUBE LOADING INSTRUCTIONS

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

CAUTION

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

FIRST AID INSTRUCTIONS

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

TRADE NAME Bio-Neutralizer®
CHEMICAL Sodium Sulfite
CHEMICAL ABSTRACT SYSTEM NO. CAS #7757-83-7
CHEMICAL DESCRIPTION Reducer
FORMULA Na₂SO₃
U.S. DOT SHIPPING NAME Non-hazardous tablets, Item NM503401
U.S. DOT HAZARD CLASS Non-hazardous

II. INGREDIENTS

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

III. PHYSICAL DATA

BOILING POINT AT 760 mm Hg Decomposes at 900° C
FREEZING/MELTING POINT Not Applicable
SOLUBILITY IN H₂O % BY WEIGHT 25% at 80° C
SPECIFIC GRAVITY OF TABLET 2.63 (H₂O = 1)
APPROXIMATE TABLET DENSITY 125 lbs./ft³
pH OF SOLUTION Alkaline
VOLUME % VOLATILE Not Applicable
APPEARANCE AND ODOR Green Tablet with Mild Odor

IV. FIRE AND EXPLOSION DATA

FLASH POINT Not Applicable
FLAMMABLE LIMITS IN AIR Not Applicable
EXTINGUISHING MEDIA Use extinguishing media appropriate for burning material. Compatible with water fog, spray foam or CO₂.
SPECIAL FIRE FIGHTING PROCEDURES NIOSH/MSHA-Approved, positive pressure, self-contained breathing apparatus with full facepiece.
UNUSUAL FIRE & EXPLOSION HAZARD At 600° C, Sodium Sulfide is formed. At 900° C, Sulfur Dioxide is formed. Inert ingredients could support combustion by burning, yielding carbon dioxide and water. Use self-contained breathing apparatus for fire fighting.

V. HEALTH HAZARD DATA

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

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

VI. EFFECTS OF OVEREXPOSURE

PERMISSIBLE No permissible exposure limits have been established by OSHA.

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

VII. EMERGENCY AND FIRST AID PROCEDURES

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

VIII. STEPS FOR MATERIAL SPILL

Spills exceeding 100 pounds should be reported to the local authorities.
1. Contain all spilled material, wearing appropriate protective equipment.
2. Place spilled material in clean, dry containers for disposal. Do not flush to surface water.

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

IX. SPECIAL PROTECTION INFORMATION

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

This Material Safety Data Sheet is offered solely for your information, consideration and investigation. Norwalk Wastewater Equipment Company provides no representations or warranties, either expressed or implied, and assumes no responsibility for the accuracy or completeness of the data contained herein.
ADDITIONAL CHEMICAL PRODUCTS FROM NORWECO

BIO-DYNAMIC® TABLET FEEDERS

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

BIO-SANITIZER® DISINFECTING TABLETS

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

BIO-GEM® ORGANIC DIGESTER

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

DISTRIBUTED LOCALLY BY:
BIOLOGICAL REMEDIATION TABLETS

GENERAL SPECIFICATIONS

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

TABLET PROPERTIES AND USAGE

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

PRODUCT APPLICATION

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

DESIGN DATA

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

SPECIAL INSTRUCTIONS

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

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

SAFETY INSTRUCTIONS

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

TABLET HANDLING

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

FEED TUBE LOADING INSTRUCTIONS

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

CAUTION

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

FIRST AID INSTRUCTIONS

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

**BIO-PERC® BIOLOGICAL REMEDIATION TABLETS**

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

## I. PRODUCT IDENTIFICATION

<table>
<thead>
<tr>
<th>TRADE NAME</th>
<th>Bio-Perc®</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEMICAL</td>
<td>Bacterial Formulation</td>
</tr>
<tr>
<td>CHEMICAL ABSTRACT SYSTEM NO.</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>CHEMICAL DESCRIPTION</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>FORMULA</td>
<td>Compound Product</td>
</tr>
<tr>
<td>U.S. DOT SHIPPING NAME</td>
<td>Non-hazardous tablets, Item NM20400</td>
</tr>
<tr>
<td>U.S. DOT HAZARD CLASS</td>
<td>Non-hazardous</td>
</tr>
</tbody>
</table>

## II. INGREDIENTS

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

## III. PHYSICAL DATA

| BOILING POINT AT 760 mm Hg | Decomposes at 200° C |
| FREZING/MELTING POINT | Not Applicable |
| SPECIFIC GRAVITY OF TABLET | 2.00 (H_2O=1) |
| APPROXIMATE TABLET DENSITY | 125 lbs./ft^3 |
| pH OF SOLUTION | Alkaline |
| VOLUME % VOLATILE | Not Applicable |
| APPEARANCE AND ODOR | Bronze Tablet with Mild Odor |

## IV. FIRE AND EXPLOSION DATA

| FLASH POINT | Not Applicable |
| FLAMMABLE LIMITS IN AIR | Not Applicable |
| SPECIAL FIRE FIGHTING PROCEDURES | NIOSH - Approved, positive pressure, self-contained breathing apparatus with full face piece. |
| UNUSUAL FIRE & EXPLOSION HAZARD | Inert ingredients could support combustion by burning, yielding carbon dioxide and water. |

## V. HEALTH HAZARD DATA

### ACUTE TOXICITY DATA (ANIMAL)

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

### CHRONIC TOXICITY

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

## VI. EFFECTS OF OVEREXPOSURE

### PERMISSIBLE

No permissible exposure limits have been established by OSHA.

### ACUTE

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

## VII. EMERGENCY AND FIRST AID PROCEDURES

**INHALATION**: Remove to fresh air. If not breathing, resuscitate and administer oxygen if readily available. Seek medical attention immediately.

**EYE CONTACT**: Immediately flush with large amounts of water for fifteen (15) minutes, rinsing eye thoroughly. Get medical attention.

**SKIN CONTACT**: Wash with plenty of soap and water for fifteen (15) minutes. Remove contaminated clothing. If skin irritation occurs, get medical attention. Wash clothing before reuse.

**INGESTION**: If conscious, drink large quantities of water or milk and induce vomiting. Call a physician immediately. Avoid alcohol.

If unconscious, or in convulsions, seek medical attention immediately. Do not induce vomiting or give anything by mouth to an unconscious person.

## VIII. STEPS FOR MATERIAL SPILL

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

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

## IX. SPECIAL PROTECTION INFORMATION

### RESPIRATORY PROTECTION

If dusty conditions are encountered, use NIOSH approved respirator with acid gas cartridge and dust pre-filter.

### VENTILATION

Store and use in a well-ventilated area.

### EYE PROTECTION

Chemical safety goggles.

### GLOVES

Natural or synthetic rubber.

### OTHER PROTECTIVE EQUIPMENT

Boots, aprons or chemical suits as required to prevent skin contact.

THIS MATERIAL SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION. NORWALK WASTEWATER EQUIPMENT COMPANY PROVIDES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, AND ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE DATA CONTAINED HEREIN.
ADDIITIONAL CHEMICAL PRODUCTS FROM NORWECO

BIO-DYNAMIC® TABLET FEEDERS

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

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

BLUE CRYSTAL® RESIDENTIAL DISINFECTING TABLETS

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

BIO-NEUTRALIZER® DECHLORINATION TABLETS

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

DISTRIBUTED LOCALLY BY:

220 REPUBLIC STREET
NORWALK, OHIO, USA 44857-1156
TELEPHONE (419) 668-4471
TELEFAX (419) 663-5440
www.norweco.com


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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.

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 Product 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.
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 2½ 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. ½ full of solids equals 50%). If the settled material contains large pockets of clear liquid, estimate the volume of these pockets and reduce the settled solids reading by that amount. A settled solids reading of up to 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.

In Singulair systems with more than one aerator, the settleable solids test should be conducted for each aeration chamber. The results of all tests should be averaged to determine the appropriate action. If test results indicate an aerator time cycle adjustment is necessary, adjust each time clock to operate on identical run cycles.

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. Remove the optional Blue Crystal and Bio-Neutralizer feed tubes. Do not allow the tubes to touch.
3. Install the Outlet Sealing Tool into the receiving flange to prevent loss of liquid from the Singulair system during service.
4. Remove the Singulair aerator and place the service funnel over the aerator mounting casting.
5. 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.
6. Using the universal tool, disengage all four black locking lugs to allow for removal of the outer chamber.
7. 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.
8. 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.
9. 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.
10. 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.
11. With the aerator running, use the hopper scraping tool to gently scrape all areas of the clarification chamber hopper side walls.

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:

<table>
<thead>
<tr>
<th>SYSTEM CAPACITY</th>
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<tr>
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<tr>
<td>Singulair</td>
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<td>Model</td>
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<td>500 GPD</td>
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<tr>
<td>1250 GPD</td>
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<td>1500 GPD</td>
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</table>

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 Product 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.

DISTRIBUTED LOCALLY BY:
NORWECO, INC.
SINGULAIR® BIO-KINETIC® SYSTEM
LIMITED WARRANTY REGISTRATION CARD

Aerator Model Number: ________________________________
Aerator Serial Number: ________________________________
Date of Installation: _______________  Installer’s Name: ________________________________
Distributed By: ______________________________________

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

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

(Owner’s Signature)
(Print Name)
(Address)
(City, State, Zip Code)

Complete and Mail Immediately

SINGULAIR® BIO-KINETIC® SYSTEM
DISTRIBUTOR SERVICE AND WARRANTY RECORD CARD

Aerator Model Number: ________________  Tank Setting Date: ________________
Serial Number: __________________________
Owner Name: ____________________________  Job Site Contractor: ________________
Address: ________________________________

(Address) (City) (State) (Township)

Directions to Site and Description: ________________________________

Optional Equipment
Tank Location: ________________  Control Location: ________________

START-UP AND INSPECTION RECORD

System Installed: ________________  18th Month: ________________
System Start-Up: ___________  24th Month: ________________
6th Month: ________________  Send Out Service Policies On: ________________
12th Month: ________________  1st Mailing: ________________
                        ____________  (22nd month)
                        ____________  2nd Mailing: ________________
                        ____________  (23rd month)
OWNER RECORD OF SERVICE CALL

☐ Routine Service Call  ☐ Special Service Call

Date: ___________________________  Time: ___________________________
Serviced By: ___________________________
System Model No: ___________________________
Aerator Model No: ___________________________
Aerator Serial No: ___________________________

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

Distributed By: ___________________________

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

HEALTH DEPT. NOTIFICATION OF SERVICE PERFORMED

☐ Routine Service Call  ☐ Special Service Call

County: ___________________________  Date: ___________________________
Serviced By: ___________________________
System Model No: ___________________________
Owner Name: ___________________________
Owner Address: ___________________________

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

Distributed By: ___________________________

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

DISTRIBUTOR SERVICE RECORD

☐ Routine Service Call  ☐ Special Service Call

Date: ___________________________  Time: ___________________________
Serviced By: ___________________________
System Model No: ___________________________
Aerator Model No: ___________________________
Aerator Serial No: ___________________________
Owner Name and Address: ___________________________

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

NORWECO, INC. - NORWALK, OHIO - U.S.A.
OUR SERVICE INSPECTION FOUND EQUIPMENT AND SYSTEM AS FOLLOWS:

- Owner Not Present
- Bio-Kinetic System Checked
- Aerator Checked
- Chlorinator Checked
- Controls Checked
- Effluent Checked

CONDITION:
- Aerator Operating Properly
- Controls Operating Properly
- Bio-Kinetic System Operating Properly
- Chlorinator Operating Properly
- Effluent Clear & Odorless

SERVICE:
- Cleaned Aspirator Shaft
- Cleaned Bio-Kinetic System
- Scrapped Tank Hopper
- System Operating Properly
- See Notes Below

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

SPECIAL NOTES: __________________________________________

________________________________________________________________________________________

OUR SERVICE INSPECTION FOUND EQUIPMENT AND SYSTEM AS FOLLOWS:

- Owner Not Present
- Bio-Kinetic System Checked
- Aerator Checked
- Chlorinator Checked
- Controls Checked
- Effluent Checked

CONDITION:
- Aerator Operating Properly
- Controls Operating Properly
- Bio-Kinetic System Operating Properly
- Chlorinator Operating Properly
- Effluent Clear & Odorless

SERVICE:
- Cleaned Aspirator Shaft
- Cleaned Bio-Kinetic System
- Scrapped Tank Hopper
- System Operating Properly
- See Notes Below

[] The Service Policy On This System Has Expired

SPECIAL NOTES: __________________________________________

________________________________________________________________________________________

OUR SERVICE INSPECTION FOUND EQUIPMENT AND SYSTEM AS FOLLOWS:

- Owner Not Present
- Bio-Kinetic System Checked
- Aerator Checked
- Chlorinator Checked
- Controls Checked
- Effluent Checked

CONDITION:
- Aerator Operating Properly
- Controls Operating Properly
- Bio-Kinetic System Operating Properly
- Chlorinator Operating Properly
- Effluent Clear & Odorless

SERVICE:
- Cleaned Aspirator Shaft
- Cleaned Bio-Kinetic System
- Scrapped Tank Hopper
- System Operating Properly
- See Notes Below

[] The Service Policy On This System Has Expired

SPECIAL NOTES: __________________________________________

________________________________________________________________________________________

Aerator Amperage:_______________ Water Level In Plant:_______________
Aerator Vibration:_______________ Effluent Quality:_______________
Aerator Noise:_______________ Plant Odor:_______________

[] Owner Would Like Us To Send A New Service Policy
Dear Owner:

When you purchased your Norweco Singulair Bio-Kinetic wastewater treatment system, a three year limited warranty and lifetime exchange program were included in the purchase price. The purchase price also provided for a two year service inspection program at no additional cost to you.

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

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

Sincerely yours,

Your Local Licensed Norweco Distributor

NORWECO, INC. - NORWALK, OHIO - U.S.A.
## SINGULAIR®
### OWNER PROTECTION SERVICE PROGRAM

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<th>AT NO ADDITIONAL OWNER EXPENSE</th>
<th>POSSIBLE EXPENSE</th>
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</table>

A. Regular service inspections conducted at six month intervals throughout the year.
B. Special service inspections as requested by owner.
C. Labor and transportation expenses for travel on regular service inspections.
D. Labor and transportation expenses for travel on special service inspections.
E. Singulair plant maintenance including Bio-Kinetic system service, visual inspection of effluent quality and cleaning of hopper section using squeegee scraper in clarification tank (where applicable).
F. Inspection of outlet line or disposal system (where accessible).
G. Singulair mechanical aerator maintenance including cleaning of the stainless steel aspirator shaft, power consumption check, noise check, and visual inspection for vibration of the unit while in operation.
H. Visual check of Service Pro control center for Singulair unit (when accessible).
I. Labor expenses required at the site to service or repair, or to remove any part of the control center or Singulair mechanical aerator to be returned for factory repair.
J. Labor required at the site to service, repair or reinstall any part of the Service Pro control center or Singulair mechanical aerator returned from factory repair.
K. Service Pro remote monitoring service (where applicable).
L. Freight costs to and from the factory and lifetime exchange program costs when factory repairs are needed.
M. Costs for replacing missing parts or repairing equipment not eligible for the lifetime exchange program.

### CONTRACT FEE $

(To Be Paid In Advance By Owner)

### OWNER ACCEPTANCE
- NAME: 
- ADDRESS: 
- EMAIL: 
- DATE: 

### NORWECO SINGULAIR DISTRIBUTOR
- NAME: 
- BY: 
- DATE: 

COMPLETE AND RETURN TO YOUR LOCAL NORWECO DISTRIBUTOR

NORWECO, INC., - NORWALK, OHIO - USA - www.norweco.com

©MMIX
To:

Local Dist.

This one year service contract for the Singulair Bio-Kinetic wastewater treatment system located at the site described above, is intended to enable the owner to economically obtain regular service inspections for the Singulair unit, as well as non-scheduled or special service that may be required by a qualified technician. When this contract is in force, the owner will not be charged for any routine service labor. Under the terms of this service agreement, a technician will regularly inspect the plant at six month intervals. It will also be inspected following each special owner service request within a 48-hour period. The contract shall remain in effect for a period of one year, as specified in the effective and expiration dates listed above.
Each Singulair Bio-Kinetic wastewater treatment system is sold complete including: delivery and installation of the tank and Bio-Static sludge return; installation and start-up of the mechanical aerator, control center and Bio-Kinetic system; three-year limited warranty with four prescheduled service inspections at six month intervals; and lifetime aerator exchange program. It is important that the Singulair order be taken and recorded carefully to insure that all federal, state and local regulations are met. A clear outline of responsibilities when the order is taken will simplify installation of the system and establish a sound working relationship with your customer and local health department.

**INSTALLATION PROCEDURE**

Installation of the Singulair system normally occurs in two phases. First, the precast concrete tankage is delivered and installed at the contractor’s convenience. Each electrical control center, underground electrical service cable and Bio-Static sludge return is also installed at this time. Only when the system is ready for start-up are the Singulair aerators and Bio-Kinetic systems delivered and installed. When the Singulair installer has completed equipment installation, he should also start-up and test the entire system and familiarize the owner with its operation. This installation procedure will assure efficient use of the contractor’s and installer’s time and protect equipment from possible damage or unauthorized start-up.

**CONTACT THE LOCAL HEALTH DEPARTMENT**

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

**DELIVERY TRUCK ACCESSIBILITY**

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

**POSITIONING THE EXCAVATION**

The Singulair tankage has three potential inlet locations. They are located on the inlet end wall and both inlet sidewalls at the same elevation. Any one of these inlets may be used. The position of the system with respect to the building, inlet sewer line and point of discharge will dictate the best inlet choice. It is not necessary to position the system with the inlet end wall facing the building. Singulair systems larger than 750 GPD require an external pretreatment tank. The pretreatment tank should be located in-line with the Singulair tank and the excavation should be sized approximately one foot wider and one foot longer than the pretreatment tank dimensions. Allow for a short distance between the tanks for installation of the submerged transfer port.

**EXCAVATION SIZE AND DEPTH**

The Singulair tank is 9’ 3” long and 5’ 6” wide. To allow adequate room for tank installation, the excavation should be at least 10’ 6” long by 6’ 6” wide. Additional overdig will be required on deeper installations or for safety where the excavation side walls are unstable. If the system requires an external pretreatment chamber, the excavation size must be increased accordingly.

The excavation depth is calculated using two factors. First, note the elevation of the sewer line as it leaves the building. From this sewer line elevation, subtract 1/8” per foot from the building to the system location. Next, subtract the dimension from the outside bottom of the tank to the inlet invert of the system as determined from the following chart:

<table>
<thead>
<tr>
<th>SYSTEM SIZE</th>
<th>INLET INVERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 GPD</td>
<td>5’ 0”</td>
</tr>
<tr>
<td>750 GPD</td>
<td>6’ 0”</td>
</tr>
<tr>
<td>1000 GPD</td>
<td>5’ 0”</td>
</tr>
<tr>
<td>1250 GPD</td>
<td>6’ 0”</td>
</tr>
<tr>
<td>1500 GPD</td>
<td>7’ 0”</td>
</tr>
</tbody>
</table>

The 1000, 1250, and 1500 GPD systems require an external pretreatment chamber. The dimension given is
based on industry standards. Confirm the dimension from your pretreatment tank before excavation takes place. The remainder is the finished excavation depth. Fall through the system from inlet invert to outlet invert is 0’ 4”. Therefore, the outlet line from the system must be installed four inches lower than the point where the inlet sewer line joins the system.

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

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

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

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

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

ELECTRICAL POWER SUPPLY
A dedicated 115 volt AC single-phase, 10 amp (minimum) 60 Hertz circuit must be provided in the main electrical service panel for each Service Pro control center.

FINISH GRADING AND LANDSCAPING
A precast concrete aerator mounting casting with vented cover is provided for each aerator and extends twenty inches above the top of the Singulair tank. The top of each cover must project a minimum of 6” above finished grade. Individual precast concrete riser castings may be added in 12” increments when necessary. If possible, determine if riser sections will be needed before tank installation is scheduled.

A precast concrete system mounting casting with non-vented cover is provided for each Bio-Kinetic system. The top of each cover must project a minimum of 6” above finished grade. Individual precast Bio-Kinetic system riser castings may be added in 12” increments when necessary. If possible, determine if riser sections will be needed before tank installation is scheduled.

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

SCHEDULING TANK DELIVERY
When all points have been fully explained, find out the customer’s preferred installation date and make preliminary scheduling with your dispatcher. Take the customer’s telephone number to call and confirm the actual date and time of tank delivery.
To insure that all work proceeds safely and efficiently, check these items prior to delivery of the Singulair tankage.

✓ Does the driver have complete and accurate directions to the installation?

✓ Does the driver have the Singulair installer’s tool kit?

✓ Are the appropriate number of aerator mounting castings, Bio-Kinetic system mounting castings, extension riser castings and vented and non-vented access covers included?

✓ Is there an adequate supply of sealing material for the tank and all plumbing connections?

✓ Does the truck have the proper pick-up bar and cable (or chain)?

✓ Are the proper quantity and size of Bio-Static sludge returns installed?

✓ Are the proper quantity of Service Pro control centers available for delivery with the tanks?

✓ Is there sufficient underground electrical cable to reach from the control center location to the tank?

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

**CHECKING THE EXCAVATION**

Before tank setting begins, the length, width and depth of the excavation should be checked. The excavation should have sufficient overdig to allow for a minimum of 6" of clearance around the entire perimeter of the Singulair system. Additional overdig will be required on deep installations or where unstable soil conditions exist. Safe working conditions must be established and maintained during the entire installation procedure.

Check the influent and effluent sewer line trenches. The depth should correspond with the Singulair system inlet and outlet connections and the trenches should be smooth to prevent damage to the sewer lines.

A tank leveling pad should be installed in the bottom of the excavation. The pad should be a minimum of 4" thick and leveled to within 1/4" from side to side and end to end. The elevation of the top of the leveling pad should correspond to the outside bottom of the Singulair precast concrete tankage when installed.

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

SINGULAIR TANK SEALING

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

TANK SETTING AND SAFETY

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

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

For 750 GPD, 1250 GPD and 1500 GPD systems, the tank ring casting should now be prepared to be set in position. Care must be used to insure the ring casting is not damaged in shipment, handling or setting. While the tank ring is still on the delivery truck, clean the groove in the casting to remove concrete chips, stones, mud or debris. Apply mastic sealant into the groove of the casting around the entire perimeter and fully across both internal baffles. Inspect the sealant after application and smooth out any bubbles or gaps. Remove all debris from the bottom of the casting along the tongue sealing section. Do not reach under or get under any portion of the casting. Carefully position the ring and lower one corner into the groove of the bottom casting. Align the sides of the ring and bottom sections and lower the ring into position.

The top casting may now be set. Remove all debris from the bottom of the casting along the tongue sealing section. Do not reach or get under any portion of the casting. Carefully position the top and lower one corner into the groove. Align the sides of the casting and lower the top into position. Before proceeding with Bio-Static sludge return assembly and installation, recheck the tank for level from side to side and end to end.
BIO-STATIC SLUDGE RETURN ASSEMBLY

Bio-Static sludge returns consist of inlet and extension sections and must be assembled prior to installation in the Singulair tank. Insert the small end of the inlet section into the socket end of the extension section until the retainer pins snap into position. A two piece assembly is used for 500 GPD and 1000 GPD systems.

A three piece assembly is used for 750 GPD, 1250 GPD and 1500 GPD systems. For 750 GPD and 1250 GPD systems the second extension section must be cut-off at the double line near the center of the extension. This cut can be made with a carpenter’s saw or other suitable tool. After cutting the extension, de-burr the inside and outside perimeter of the extension with a router or sharp knife.

NOTE: Failure to de-burr may cause sludge return plugging. Install the cut-off extension on the bottom of the first extension section until the retainer pins of the first extension snap into place. The 1500 GPD system uses an assembly of one sludge return inlet with two full extensions and no cut-off is required.

BIO-STATIC SLUDGE RETURN INSTALLATION

All Bio-Static sludge returns must be installed through the openings in the top of the clarification chamber, prior to installation of the Bio-Kinetic system mounting castings. A single Bio-Static sludge return assembly is installed in 500 GPD, 750 GPD and 1000 GPD systems. Two sludge return assemblies are installed in 1250 GPD and 1500 GPD systems. After the sludge return has been assembled to the correct length, it should be installed into the opening in the clarification chamber wall. Securely grasp the assembled sludge return by the inlet with the opening facing away from you. Lower the assembly through the clarification chamber access opening in the top of the tank. Firmly push the inlet of the sludge return through the opening in the clarification chamber wall until the four retainer lugs snap into position and the assembly is securely mounted. The standoff on the lower most extension piece should be touching the clarification chamber wall just above the transfer port. Repeat these steps when two Bio-Static sludge returns are required.

MOUNTING CASTING AND OPTIONAL EXTENSION RISER INSTALLATION

Locate the power cable entrance in each aerator mounting casting. It should be inspected for flash or sharp edges. Be sure it extends all the way through the casting side wall. Remove the cast-in access cover from the top of each aeration chamber. Apply a strip of mastic sealant around the perimeter of each access opening. Position and install each aerator mounting casting with the power cable entrance facing the tank side wall that is closest to the building. Be sure that each mounting casting is properly seated on the tank top and evenly sealed with mastic. If extension riser castings are required, install them as needed above each aerator mounting casting. Apply mastic sealant to all joints between castings. Do not apply sealant to the top of the mounting casting or riser that will receive the vented access cover.
TANK DELIVERY AND SETTING (Cont.)

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

SEWER LINE INSTALLATION

Sewer lines may be installed as soon as the Singulair concrete tankage has been leveled and sealed. Sewer line trenches must be smoothly excavated and free of debris or sharp-pointed objects that could damage the installation. The trenches must allow sewer lines to be laid with 1/8” of fall per lineal foot of run along the entire length of the line. Influent and effluent sewer lines must be at least four inches in diameter. The influent line should be grouted into the Singulair system tank inlet. The effluent line should be PVC pipe, solvent welded into the Singulair outlet coupling. Inlet and outlet lines must be laid continuously and unspliced from the tank to undisturbed earth beyond the limits of the tank excavation. High quality PVC or other similar materials may be used for sewer lines, subject to the approval of local codes. Be sure the sewer lines are constructed with compatible fittings and joining materials throughout. Underground electrical cable for electrical service to each Singulair aerator should be installed in the sewer line trench before backfilling. Refer to Electrical Wiring and Control Center Installation instructions for complete details.

GROUND WATER RELIEF POINT

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

BACKFILLING

The Singulair tankage should be backfilled immediately after sewer lines and underground electrical cable are installed. Fine, loose earth should be used to backfill the tank excavation and sewer line trenches. Be sure it is completely free of rocks, large clumps of earth and construction debris. Backfill evenly around the entire perimeter of the tank rather than all at once on each side. Take care to completely fill in the cavity beneath the slanted clarifier end wall. Final grading should be six inches below the top of each access cover and should slope away from the tank so surface runoff will drain away from the Singulair system. Use extreme care in backfilling. Do not allow dirt or mud to enter any part of the Singulair system or sewer lines. If dirt or mud enters any portion of the system, it must be removed to insure proper system operation. Removing the dirt or mud may require repeated flushing and tank pumping.

TANK HOLD DOWN WATER

Each compartment in the Singulair system must be filled with clean water. The water should be free of leaves, mud, grit, oils or other materials that might possibly interfere with system operation. The tankage should be filled with water as it is backfilled to reduce stress on the precast concrete tank. Do not fill the Singulair tank with water through the opening in the top of the clarification chamber. The clarification chamber will be filled by adding water to the aeration chamber. In systems with more than one aeration chamber, each aeration chamber should be filled separately. In all systems, pretreatment chambers should be filled through their access openings.

This completes the portion of the installation that requires a delivery truck for tank lifting and setting. Installation of the electrical control center and underground electrical cable are normally completed by the delivery truck driver before leaving the site. Refer to Electrical Wiring and Control Center Installation instructions for details.
The underground electrical service cable for the Service Pro control center should be installed by the tank delivery truck driver or electrician as soon as the Singulair tankage has been installed in the prepared excavation. Usually it is best to begin with the underground service cable so that backfilling of the Singulair tankage and influent sewer line is not delayed. The information contained in these instructions is not intended to be a complete electrical installation reference, as code requirements vary according to geographic area. Always insure safe working procedures are followed whenever electrical work is performed on the Singulair system.

UNDERGROUND ELECTRICAL CABLE INSTALLATION

To insure proper electrical system protection and uninterrupted service to the Singulair aerator and control center, be sure to follow these instructions carefully. Always double check all work before leaving the job site.

1. Electrical work must be performed in accordance with the latest edition of the National Electrical Code as well as all applicable local codes.
2. Underground electrical service cable used with the Singulair system must be UL and CSA approved, type UF, #14/2 AWG minimum and must have a full-size center ground. Larger cable is required if the underground service needs to be run more than 80 feet. Consult your electrician for details.
3. The underground cable installation must be unspliced from the location of the Service Pro control center into the aerator mounting riser above the aeration chamber of the Singulair tank.
4. Install a watertight conduit fitting into the power cable entrance in the side of the aerator mounting riser. Insert the free end of the power cable through a pre-formed two foot by one foot conduit ell, then into the watertight conduit fitting in the power cable entrance of the aerator mounting riser. Guide the power cable up into the aerator mounting riser. Pull enough cable through the riser to reach thirty-six inches above the riser opening. Coil and secure the cable in the mounting riser so that it will not hang down into the tank while the system is being filled with water.
5. Lay the conduit ell with cable directly across the top and down the tank side. Do not allow the power cable to be laid across the end of the tank or any removable access cover. Insure the conduit and cable entrance openings are sealed.
6. Check the excavation and sewer line trench to be sure they are free of debris, rocks and any sharp or abrasive objects.
7. Uncoil the electrical service cable into the excavation and influent sewer line trench. Leave sufficient slack in the cable so that it will not be stressed or pulled tight during backfilling or settling.
8. Backfill around the underground electrical cable with fine granular material.
9. The underground electrical cable should have at least two feet of earth cover. If the proposed finished grade will not permit this coverage, the cable should be installed in approved conduit from the tank to the building foundation.
10. Always encase the electrical cable in conduit any time it is above finished grade. Route the conduit and cable as directly as possible to the control center mounting location.

INSTALLATION OF ELECTRICAL CONTROL CENTER

Although the aerator is not installed until system start-up, the control center should be wired for operation when the tank and underground electrical cable are installed. The control center should be located so the red warning light can be seen and the audible alarm heard. The mounting location should minimize exposure to direct sunlight,
ELECTRICAL WIRING & CONTROL CENTER INSTALLATION (Cont.)

freezing rain or conditions that might prevent routine inspection or access. The control center should always be mounted out of the reach of children.

Detach the control center cover from the enclosure and remove the insert from the mounting posts. Set the control center insert aside. Remove two of the three ⅛" knockouts in the bottom of the control center enclosure. Install a conduit connector into each of the openings. For installations requiring a NEMA 3R rated enclosure, remove the ⅛" drain opening knockout to vent moisture from the enclosure. Exposed wiring to or from the control center should always be enclosed in conduit. NOTE: Be sure to assemble the hub to the conduit before connecting the hub to the enclosure. Mount the enclosure securely using masonry nails, wood screws or common nails as appropriate. The following steps should be performed by the installing electrician to complete system wiring:

1. Use a dedicated 115 volt AC, single-phase, 15 amp (maximum) circuit breaker in the main electrical panel for service to the Singulair aerator.

CAUTION: Make sure the circuit supplying power to the Singulair system is de-energized. Check it with an electrician’s test light before proceeding. Remember that other circuits in the main electrical service panel may remain energized as you are working. Use only tools with insulated handles, stand in a dry location and work with extreme care.

2. Run the black wire from the dedicated breaker in the main electrical service panel to the black wire attached to the Service Pro control center. Use at least #14 AWG black solid copper wire. To connect the wire leads, strip off the insulation jacket ⅛" from the end of each insulated wire lead. Twist the stripped leads together and secure the connection with a yellow wire nut connector.

3. Wire from the neutral in the main service panel to both the white wire in the underground electrical cable from the Singulair aerator and the white wire attached to the Service Pro control center. Use at least #14 AWG white solid copper wire. Strip off the insulation jacket ⅛" from the end of each insulated wire lead. Twist the three stripped leads together and secure the connection with a yellow wire nut connector.

4. Install a grounding conductor from the ground lug in the main service panel to the control center. This wire must be attached to the non-insulated ground lead in the aerator underground electrical cable and the green wire attached to the Service Pro control center. Strip off the insulation jacket ⅛" from the end of the insulated wire lead. Twist the three stripped leads together and secure the connection with a yellow wire nut connector.

5. Connect the black lead of the underground electrical cable from the aerator to the red wire attached to the Service Pro control center. Use at least #14 AWG black solid copper wire. To connect the wire leads, strip off the insulated jacket ⅛" from the end of each insulated wire lead. Twist the stripped leads together and secure the connection with a yellow wire nut connector.

6. Inspect your work to make sure all wires are connected to the appropriate locations, there are no breaks in the wiring insulation and that all connections are secure.

7. Before installing the control center insert, energize the circuit breaker in the main electrical service panel and, with your electrical multi-meter, test the voltage being supplied. It should read between 109 volts and 121 volts supplied between the black and white wires attached to the control center. Once the voltage has been confirmed, place the dedicated circuit breaker in the main service panel in the “off” position. The conduit openings in the control center must now be sealed using duct seal. IMPORTANT: The conduit openings must be sealed to prevent corrosive gas from entering the control center enclosure which could result in a fire or explosion. Failure to properly seal all conduit openings will void the warranty.

8. Close the insulator and snap into position.

9. Clearly label the dedicated circuit used for the Singulair system on the door of the main service panel. Replace the service panel dead front and enclosure cover.

10. Make sure the selector switch in the control center is in the “off” position.

BEFORE LEAVING

Tear off the bottom portion of the three-part Warranty Registration Card entitled Singulair Bio-Kinetic System Service and Warranty Record. Record the tank setting date and owner’s name, address and telephone number. Fill in the contractor’s name, directions to and description of the job site, optional equipment installed and location of the Singulair tank and control center. On the back side of the card list the date the owner and/or contractor anticipates the system will be ready for start-up. Take this portion of the card with you for your permanent record of this installation, leaving the remaining two portions intact and attached to the control center. Place the remaining portions of the Warranty Registration Card and Owner’s Manual in a secure location inside the facility.
The advanced integrated circuitry of the Service Pro control center simplifies the Singulair installation, improves system performance and allows for communication with the Service Pro website. The control center insert and enclosure provide space for power and communication wiring connections. The integrated circuitry continually monitors both motor over current and under current conditions and minimizes nuisance alarm conditions using the automatic restart feature. To reduce unnecessary service calls, the control center shuts down the Singulair aerator in the event of an over current or an under current alarm condition, illuminates the alarm light and begins an automatic two hour aerator restart attempt sequence before activating the audible alarm and telemetry system.

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

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

**INSTALLATION OF ELECTRICAL CONTROL CENTER**

Although the aerator is not installed until system start-up, the Service Pro control center should be wired for operation when the tank and underground electrical cable are installed. Complete steps 1 through 10 of the “Underground Electrical Cable Installation” section of the Electrical Wiring and Control Center Installation instructions. The control center should be located so the warning light can be seen and the audible alarm heard. The mounting location should minimize exposure to direct sunlight, freezing rain or conditions that might prevent routine inspection or access. The control center should always be mounted out of the reach of children. If the Singulair system is to be remotely monitored, the steps in the Getting Started Website Instructions can be completed either before or after Service Pro control center installation.

Detach the control center cover from the enclosure, remove the insert from the mounting posts and set the control center insert aside. Remove two of the three 1/2" knockouts in the bottom of the control center enclosure if you are not using any auxiliary alarm inputs. Remove all three of the knockouts in the bottom of the control center enclosure if you are using the auxiliary alarm inputs. **NOTE:** All alarm wires must be in a conduit separate from the power lines. Install a conduit connector into each of the openings. Remove the knockout for the communications cable only if the communication grommet will be used. For installations requiring a NEMA 3R rated enclosure, remove the 1/8” drain opening knockout to vent moisture from the enclosure. Exposed wiring to or from the control center should always be enclosed in conduit. **NOTE:** Be sure to assemble the hub to the conduit before...
connecting the hub to the enclosure. Mount the enclosure securely. The following steps should be performed by the installing electrician to complete system wiring:

1. Use a dedicated 115 volt AC, single-phase, 15 amp (maximum) circuit breaker in the main electrical panel for service to each Singulair aerator.

CAUTION: Make sure the circuit is de-energized. Check it with an electrician's test light before proceeding. Remember that other circuits in the service panel may remain energized as you are working. Use only tools with insulated handles, stand in a dry location and work with extreme care.

2. Connect the black wire from the dedicated breaker in the main service panel to the black wire provided on the circuit board. Use at least #14 AWG black solid copper wire. To connect to the wire leads, strip off the insulation jacket 7/16" from the end of each insulated wire lead. Twist the stripped leads together and secure the connection with a yellow wire nut connector.

3. Wire from the neutral in the main service panel to both the neutral wire in the underground electrical cable from the Singulair aerator and the white wire provided on the circuit board. Use at least #14 AWG white solid copper wire. Strip off the insulation jacket 7/16" from the end of each insulated wire lead. Twist the three stripped leads together and secure the connection with a yellow wire nut connector.

4. Install a grounding conductor from the ground lug in the main service panel to the control center. This wire, along with the non-insulated ground lead in the aerator underground electrical cable and the green ground wire attached to the optional telephone communications module, if equipped, must all be connected to the green wire provided on the circuit board. Strip off the insulation jacket 7/16" from the end of the insulated wire lead. Twist the four ground leads together and secure the connection with a yellow wire nut connector.

CAUTION: Never allow the white neutral leads and ground leads to be spliced together or connected to common terminals. Failure to connect the Service Pro control center to a proper ground will void the Singulair system warranty.

5. Connect the black lead of the underground electrical cable from the aerator to the red wire provided on the circuit board. Use at least #14 AWG black solid copper wire. To connect to the power connector lead, strip off the insulation jacket 7/16" from the end of each wire lead. Twist the stripped leads together and secure the connection with a yellow wire nut connector.

6. If auxiliary alarm inputs are being used, skip to AUXILIARY ALARM INPUTS.

7. Inspect your work to make sure there are no breaks in the wiring insulation and that all connections are secure.

8. Before installing the control center insert, energize the circuit breaker in the main electrical service panel and, with your electrical multi-meter, test the voltage being supplied. Set up the meter to read AC voltage on the 0-150 volt scale. Place one probe of the meter into the yellow wire nut connector attached to the black lead and one probe into the yellow wire nut connector attached to the white lead. It should read between 109 volts and
121 volts. If it is within these limits, place one probe of the multi-meter into the yellow wire nut connector attached to the red lead and one probe on the power connector pin attached to the white lead. The meter should read zero volts. Once these readings are confirmed, place the dedicated circuit breaker in the main service panel in the “off” position.

9. The conduit openings in the control center must now be sealed. Expanding foam sealant is recommended for this purpose. Insure sealant complies with local code requirements. Follow manufacturer’s instruction when adding expanding foam sealant into the conduits. **IMPORTANT:** The conduit openings must be sealed to prevent moisture and corrosive gas from entering the control center enclosure which could result in a fire, explosion or damage to the control center. Failure to properly seal all conduit openings will void the Singulair system warranty.

10. Close the insulator and snap the insert into position.

11. When the auxiliary inputs are used, label the corresponding auxiliary alarm light located on the front of the Service Pro control center insert using the labels provided.

12. Clearly label the dedicated circuit used for each Singulair aerator on the door of the main electrical service panel in the home. Replace the service panel dead front and enclosure cover.

13. Make sure the selector switch in the control center is in the “off” position.

14. Complete the steps outlined in the “Before Leaving” section of the Electrical Wiring and Control Center Installation instructions.

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

1. Determine the type of output that is generated by the alarm device you wish to connect.
2. Route the leads through one of the conduits not being used for power lines into the bottom of the enclosure. Be sure to pull enough wire to comfortably reach the two auxiliary terminals you will be connecting to on the back of the control center insert.
3. Crimp the insulated female 0.110” quick connect receptacles to the ends of the alarm leads.
4. Connect the leads to the corresponding auxiliary alarm inputs. When connecting a relay circuit, connect to the “RELAY +” and “RELAY -” terminals. For a voltage input, connect the leads to the auxiliary alarm terminals marked “V+” and “V-”.
5. When connecting a device that uses a relay contact setting, you will need to set the jumper for the correct relay configuration. If the alarm circuit is normally closed, place the jumper over the bottom two jumper pins closest to the ‘C’ label. If the alarm circuit is normally open, place the jumper over the top two jumper pins closest to the ‘O’ label (see CONNECTING AUXILIARY ALARM INPUTS on Page 3 for reference).
COMMUNICATION CABLE INSTALLATION REQUIREMENTS

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

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

1. Make sure the dedicated circuit breaker in the main service panel is in the “off” position. Using the auxiliary input conduit or one of the grommets provided, run the telephone or network cable into the bottom of the enclosure. **NOTE:** The telephone or network cable cannot be installed into a conduit with any power lines. Crimp the appropriate phone or network jack on the communications cable in the control center.
2. Connect the telephone or network cable into the jack provided on the control panel. Connect the other end of the communications cable to the existing telephone system or home Internet service.
3. Snap the control center insert into position. Close the control center cover.

RESET BUTTON

The reset button on the Service Pro control center is used to perform multiple tasks during installation and operation. To activate the reset button, apply pressure with your index finger. The button is activated when a “click” is heard. The reset button can be used to silence the audible alarm, turn on the aerator when it is in an off cycle or restart the run cycle when the aerator is currently running. The reset button is also used to test the control center audible and visual alarms and telemetry system. **NOTE:** Excessive pressure on the reset button should be avoided.

To test the alarms, press and hold the reset button for approximately five seconds until the alarms activate and then release. After five seconds, the panel will call out and deliver an alarm test message to the Service Pro monitoring system. Once the communication is complete, the control center will return to normal operation.

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

TELEMETRY SYSTEM COMMISSIONING

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

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

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

**AERATOR TIMER**

Each control center is supplied with an adjustable timer that determines the run time of the aerator. The timer is adjustable in 5 minute increments up to continuous operation and will not permit the aerator to run less than 30 minutes out of each hour. Full time operation is achieved by turning the dial so that the arrow points to the “continuous” position. Use a small blade screwdriver to rotate the adjustment dial to the desired position. The timer is factory preset and should only be adjusted after carefully reviewing the Time Clock Setting and Service Instructions.

**ALARM CONDITION OPERATING SEQUENCE**

When the control center detects an over current or an under current alarm condition, the alarm light will activate and flash a code that specifies the alarm condition that was detected. If an under current or open motor condition is detected, the alarm light will flash two short flashes. If a high water or over current condition is detected, the alarm light will flash steadily. If either an over current or an under current alarm condition is detected, the Singulair aerator is shut down and an automatic system restart sequence begins. With the alarm light flashing, the control center will automatically attempt to restart the aerator every five minutes for a period of two hours (24 restart attempts). The control center monitors motor current during each restart attempt. If the proper level of current is detected, the control center returns the aerator to normal operation and turns off the alarm light. Pressing the reset button while the alarm light is flashing causes the control center to attempt to restart the aerator.

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>RED ALARM LIGHT DIAGNOSTIC CODES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Successful commissioning</td>
<td>Flash 5 short and stop</td>
</tr>
<tr>
<td>Alarm test</td>
<td>Flash 10 short and stop</td>
</tr>
<tr>
<td>Service visit start</td>
<td>Flash 1 short, 1 long - pause 3 seconds &amp; repeat</td>
</tr>
<tr>
<td>Service visit end</td>
<td>Flash 2 short, 1 long - pause 3 seconds &amp; repeat</td>
</tr>
<tr>
<td>Communications cable not plugged in</td>
<td>Flash 3 short, 1 long - pause 3 seconds &amp; repeat</td>
</tr>
<tr>
<td>Phone line in use in home</td>
<td>Flash 4 short, 1 long - pause 3 seconds &amp; repeat</td>
</tr>
<tr>
<td>Number called is busy</td>
<td>Flash 5 short, 1 long - pause 3 seconds &amp; repeat</td>
</tr>
<tr>
<td>Remote monitoring center error</td>
<td>Illuminate continuous</td>
</tr>
<tr>
<td>Phone service terminated</td>
<td>Flash 2 short - pause 3 seconds &amp; repeat</td>
</tr>
<tr>
<td>Service Pro panel communication error</td>
<td>Flash 2 short - pause 3 seconds &amp; repeat</td>
</tr>
<tr>
<td>Control failure</td>
<td>Flash 2 short - pause 3 seconds &amp; repeat</td>
</tr>
<tr>
<td>Aerator under current</td>
<td>Flash 2 short - pause 3 seconds &amp; repeat</td>
</tr>
<tr>
<td>Aerator open motor</td>
<td>Flash 2 short - pause 3 seconds &amp; repeat</td>
</tr>
<tr>
<td>Aerator over current</td>
<td>Flash 2 short - pause 3 seconds &amp; repeat</td>
</tr>
<tr>
<td>Auxiliary one, two and three</td>
<td>Flash evenly until serviced</td>
</tr>
</tbody>
</table>
and counts toward the 24 restart attempts. If the aerator does not restart after 24 attempts, the audible alarm and the alarm light activate.

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

If the telemetry system on the Service Pro control center has been commissioned, the system will then attempt to call out after a five minute delay and deliver an alarm message. The system will call the Service Pro monitoring center every 48 hours until the alarm condition is corrected and the control center is reset. The Service Pro control center uses advanced diagnostic technology to monitor the Singulair system for proper operation. In the event an alarm condition is encountered, the control center will display a series of flashes from the alarm light located in the center of the control panel (refer to the Red Alarm Light Diagnostic Codes chart on Page 5 for further reference).

**SYSTEM HEARTBEAT FEATURE**

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

**FCC COMPLIANCE**

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

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

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

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

**SERVICE PRO WEBSITE & REGISTRATION**

The telemetry system, standard with Service Pro MCD and TNT control centers, is engineered to interface with the Service Pro monitoring center. The Service Pro monitoring center allows the homeowner, service provider, licensed Norweco distributor and authorized regulatory entities online access to Singulair wastewater treatment system records. Records generated by the Service Pro control center (heartbeat record, alarm conditions, service records) can be accessed at www.servicepromcd.com. For access to the website, contact your local distributor or Norweco, Inc.

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

- The “Add New Subscriber” section of the website has been completed by the Singulair distributor or service provider
- The system is started up and the Service Pro control center is commissioned
- Three copies of the signed Service Pro Subscriber Monitoring Agreement are received by Norweco

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

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

The Monitoring Agreement is completed with the owner of each system to be monitored by the website. The top three copies of the Agreement should be submitted to Norweco. This activates monitoring and satisfies Norweco’s warranty registration procedure. Refer to the Subscriber Monitoring Agreement Guide for further information.
The information contained in these instructions is not intended to be a complete electrical installation reference, as code requirements vary according to geographic area. These instructions focus only on the specific requirements for the Service Pro ISC controls. They do not cover all installation aspects of the underground electrical cable and control center, preliminary inspection, testing and service of the control center or troubleshooting. Complete instructions are contained in the Bio-Kinetic Wastewater Treatment System Electrical Wiring and Control Center Installation yellow sheet. All electrical work must be performed in accordance with the latest edition of the National Electrical Code and all applicable local codes.

UNDERGROUND ELECTRICAL CABLE INSTALLATION

1. A separate underground electrical service cable must be installed from the main electrical panel in the home to the Service Pro ISC control center. The electrical service cable must be UL or CSA approved, type UF, #12/2 AWG minimum and must have a full-size center ground. Larger cable is required if the underground service needs to be run more than 80 feet.

2. A separate underground electrical service cable must be installed for each aerator within the Singulair system. The electrical service cable must be UL or CSA approved, type UF, #14/2 AWG minimum and must have a full-size center ground. Larger cable is required if the underground service needs to be run more than 80 feet.

3. A separate underground electrical service cable must also be installed for the effluent pump and each float switch. The electrical service cable supplying power to the pump must be UL or CSA approved, type UF, #12/2 AWG minimum and must have a full-size center ground. Larger cable is required if the underground service needs to be run more than 80 feet. NOTE: The float switch cables carry low voltage for controls only and do not carry the full electrical load of the pump. Float switch cables should be #16 AWG minimum.

4. Each underground cable must be continuous and unspliced from the Service Pro ISC to the main electrical panel in the home, aerator, pump and float switches. Underground cable must be protected in conduit anytime the cable path passes directly across a tank or underground structure.

5. Uncoil the electrical service cables into the influent sewer line trench. Extend the aerator cable to the aerator mounting casting. Extend the pump and float switch electrical service cables to the pump station chamber. NOTE: Leave sufficient slack in the electrical cables so they will not be stressed or pulled too tight during backfilling or settling.

6. All underground electrical cables should have at least two feet of earth cover to prevent damage from landscaping, trenches, etc. If the proposed finished grade will not permit at least two feet of earth cover, all cables should be installed from the control center to the appropriate component using an approved conduit.

INSTALLATION OF ELECTRICAL CONTROL CENTER

Although the aerator and effluent pump are not installed until the system is ready for start-up, the control center should be wired for operation when the tankage and underground electrical cables are installed. The Service Pro ISC controls should be located so that all warning lights can be readily seen and the audible alarm heard. The mounting location should minimize exposure to direct sunlight, freezing rain or conditions that might prevent routine inspection or access. The control center should always be mounted out of the reach of children.

Drill the appropriate openings in the bottom of each control center and install a conduit connector in each opening. Exposed wiring to or from the control center should always be encased in conduit. Mount the control center securely using masonry nails, wood screws or common nails as appropriate.
1. Use a dedicated 120 volt AC, 20 amp, single-phase circuit breaker in the main electrical panel for service to the Service Pro ISC control center. **CAUTION:** Make sure the breaker is de-energized. Check it with an electrical multi-meter before proceeding with installation of the control center. Remember that other circuits in the service panel may remain energized as you are working. Use only tools with insulated handles, stand in a dry location and work with extreme care.

2. Wire from a dedicated breaker in the main service panel to the “INCOMING POWER” terminal marked “L1” in the control center using copper wire with black insulation.

3. Wire from the neutral in the main service panel to the “INCOMING POWER” terminal marked “N” in the control center using copper wire with white insulation.

4. Connect the ground conductor from the ground in the main service panel to the ground lug in the control center. **IMPORTANT:** Never allow the white neutral leads and ground leads to be spliced together or connected to common terminals.

5. Connect the power wire from the pump to the “PUMP POWER” terminal marked “P1” in the control center using copper wire with black insulation.

6. Connect the neutral wire from the pump to the “PUMP POWER” terminal marked “N” in the control center using copper wire with white insulation.

7. Connect the ground conductor from the pump to the ground lug in the control center.

**CONTROL CENTER WIRING**

8. Connect the power wire from the aerator to the “AERATOR POWER” terminal marked “A1” in the control center using copper wire with black insulation.

9. Connect the neutral wire from the aerator to the “AERATOR POWER” terminal marked “N” in the control center using copper wire with white insulation.

10. Connect the ground conductor from the aerator to the ground lug in the control center.

11. Connect the wires from the float switches into the terminal block in the lower right corner of the Service Pro ISC control center.

12. Connect the wires from the on/off float switch to the two terminals marked “ON/OFF FLOA T”.

13. Connect the wires from the high water alarm float switch to the two terminals marked “ALARM FLOA T”.

14. If a timer override float switch is being installed, connect the wires from the timer override float switch to the terminals marked “OVERRIDE FLOA T”.

15. If auxiliary inputs are being connected to the Service Pro ISC control center, remove the four thumb screws from the display and lift the display to access the auxiliary input connections.

16. If the auxiliary device uses dry contact (no voltage supplied) to signal an alarm condition, connect the wires from the auxiliary device to the “AUX 1”, “AUX 2” or “AUX 3” terminals marked “AUX RELAY CONTACTS” on the left side of the circuit board below the display.

17. If the auxiliary device supplies a voltage (5 to 120 volts) to signal an alarm condition, connect the wires from the auxiliary device to the “AUX 1”, “AUX 2” or “AUX 3” terminals marked “AUX AC/DC CONTACTS” on the right side of the circuit board below the display. **CAUTION:** Do not connect devices to both the “AUX RELAY CONTACTS” and “AUX AC/DC CONTACTS” terminals for a single auxiliary input. Doing so may damage the circuit board.

18. Inspect your work to make sure that there are no breaks in wiring insulation and that all connections are secure. Tighten all screws on the terminal board.

19. Carefully form all wiring neatly into the lower part of the Service Pro ISC control center. Do not allow the wires to make contact with other electrical components.

20. **IMPORTANT:** Seal all conduit openings with duct seal compound or similar appropriate material.

21. Clearly label the dedicated circuit breaker used for the Service Pro ISC control center inside the door of the main service panel.

22. Place all three circuit breakers in the Service Pro ISC control center in the “off” position. Close and secure the control center cover.

**BEFORE LEAVING**

Complete all of the remaining steps outlined in the Bio-Kinetic Wastewater Treatment System Electrical Wiring and Control Center Installation yellow sheet. Check to insure that all electrical controls, circuits and wiring for the Singulair system are de-energized. Be sure the red warning tag and distributor identification label are attached to the control center.
The information contained in these instructions is not intended to be a complete electrical installation reference, as code requirements vary according to geographic area. These instructions focus only on the specific requirements for the Service Pro ISC controls. They do not cover all installation aspects of the underground electrical cable and control center, preliminary inspection, testing and service of the control center or troubleshooting. Complete instructions are contained in the Bio-Kinetic Wastewater Treatment System Electrical Wiring and Control Center Installation yellow sheet. All electrical work must be performed in accordance with the latest edition of the National Electrical Code and all applicable local codes.

**PROGRAMMING THE PANEL**

1. After wiring has been completed, the Service Pro ISC control center must be programmed to operate the Singulair system. Make sure the breakers in the home and in the panel are both in the "on" position and the display in the control center reads “SERVICE PRO OK” on the top line.

2. Press the “MENU” button on the touchpad to access the programming menu of the control center. "SET CLOCK" and "SET HOURS" will be displayed on the screen. Press the “UP” or "DOWN" button on the touchpad to set the correct hours value.

3. Once the correct hours value is displayed, press the “RIGHT” button to set the minutes value. The display will read “SET MINUTES”. Press the “UP” or "DOWN" button to set the correct minutes value.

4. Once the correct minutes value is displayed, press the “RIGHT” button to set the seconds value. The display will read “SET SECONDS”. Press the “UP” or "DOWN" button to set the correct seconds value.

5. Once the correct seconds value is displayed, press the “RIGHT” button on the touchpad to set the aerator run time. The display will read “AERATOR RUN TIME”. Press the “UP” or "DOWN" button to change the aerator run time in one minute increments. This value can be set from 30 minutes up to continuous operation.

6. Once the aerator run time has been set, press the “RIGHT” button on the touchpad to set the pump timer mode. The display will read “PUMP TIMER MODE”. Press the “UP” or "DOWN" button to change the timer mode. Available options include NO TIMER mode, TIME OF DAY mode and CYCLE TIMER mode. NO TIMER mode operates the pump on a demand use basis controlled by the float switches. TIME OF DAY mode enables the pump to operate at a set time range during the day and works in conjunction with the float switches. CYCLE TIMER mode enables pump operation on a repeat cycle and works in conjunction with the float switches. For TIME OF DAY mode, proceed to step 7 below. For CYCLE TIMER mode, proceed to step 8 below.

7. If the TIME OF DAY mode has been selected, press the “RIGHT” button on the touchpad to set the pump on time. This is the time of day that the pump will begin operating.
   a. “PUMP ON TIME” and “SET HOURS” will be displayed on the screen. Press the “UP” or "DOWN" button to set the desired hours value.
   b. Once the correct hours value has been set, press the “RIGHT” button to set the minutes value. The display will read “SET MINUTES”. Press the “UP” or "DOWN" button to set the desired minutes value.
   c. Once the correct minutes value has been set, press the “RIGHT” button to set the pump off time. This is the time of day that the pump will be disabled. “PUMP OFF TIME” and “SET HOURS” will be displayed on the screen. Press the “UP” or "DOWN" button to set the desired hours value.
   d. Once the correct hours value has been set, press the “RIGHT” button to set the minutes value. The display will read “SET MINUTES”. Press the “UP” or "DOWN" button to set the desired minutes value.
   e. Proceed to step 9 below.
8. If the CYCLE TIMER mode has been selected, press the “RIGHT” button on the touchpad to set the pump on time. This is the length of time that the pump will operate each cycle.
   a. “PUMP CYCLE ON TIME” and “SET HOURS” will be displayed on the screen. Press the “UP” or “DOWN” button to set the desired hours value.
   b. Once the correct hours value has been set, press the “RIGHT” button to set the minutes value. The display will read “SET MINUTES”. Press the “UP” or “DOWN” button to set the desired minutes value.
   c. Once the correct minutes value has been set, press the “RIGHT” button to set the seconds value. The display will read “SET SECONDS”. Press the “UP” or “DOWN” button to set the desired seconds value.
   d. Once the correct seconds value has been set, press the “RIGHT” button to set the pump off time. “PUMP CYCLE OFF TIME” and “SET HOURS” will be displayed on the screen. Press the “UP” or “DOWN” button to set the desired hours value.
   e. Once the correct hours value has been set, press the “RIGHT” button to set the minutes value. The display will read “SET MINUTES”. Press the “UP” or “DOWN” button to set the desired minutes value.
   f. Once the correct minutes value has been set, press the “RIGHT” button to set the seconds value. The display will read “SET SECONDS”. Press the “UP” or “DOWN” button to set the desired seconds value.

9. Press the “RIGHT” button on the touchpad to enter the auxiliary input alarms configuration screen. The display will read “AUXILIARY ALARMS” and the AUX1 value should be selected. Press the “UP” or “DOWN” button to change the auxiliary 1 input from N-OP (normally open) to N-CL (normally closed) if required. If auxiliary input 1 will not be used, leave AUX1 set to N-OP.

10. Once auxiliary input 1 has been configured, press the “RIGHT” button on the touchpad to configure auxiliary input 2. The AUX2 value should be selected. Press the “UP” or “DOWN” button to change the auxiliary 2 input from N-OP (normally open) to N-CL (normally closed) if required. If auxiliary input 2 will not be used, leave AUX2 set to N-OP.

11. Once auxiliary input 2 has been configured, press the “RIGHT” button on the touchpad to configure auxiliary input 3. The AUX3 value should be selected. Press the “UP” or “DOWN” button to change the auxiliary 3 input from N-OP (normally open) to N-CL (normally closed) if required. If auxiliary input 3 will not be used, leave AUX3 set to N-OP.

12. Press the “RIGHT” button on the touchpad to exit the programming menu. The display should read “SERVICE PRO OK” on the top line. The Service Pro ISC control center programming is complete and the system is now ready for operation.

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### VIEW SYSTEM STATUS AND CONFIGURATION

The Service Pro ISC control center records parameters regarding the Singulair system that can be reviewed at any time. Adjustments to the programming can be made as required. To review recorded data and system parameters:

1. Press the “SELECT” button on the touchpad. The screen should display the elapsed pump run time.
2. Press the “RIGHT” button to review the pump cycle count.
3. Press the “RIGHT” button to review the aerator elapsed run time.
4. Press the “RIGHT” button to review the auxiliary input configurations.
5. Press the “RIGHT” button to review the auxiliary input status, software version and panel serial number.
6. The Service Pro ISC control center has a built-in alarm test feature. To start an alarm test, hold the “TEST” button for five seconds. The screen will display “PUMP TEST” and the visual alarms will turn on for five seconds. After five seconds, the alarms will turn off.

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### PUMP TEST

The Service Pro ISC control center has a built-in pump test feature. To start a pump test, hold the “TEST” button for five seconds. The screen will display “PUMP TEST” and the pump will turn on. The pump will operate for 60 seconds and then will turn off.

### ALARM TEST

The Service Pro ISC control center has a built-in alarm test feature. To start an alarm test, hold the “RESET” button for five seconds. The screen will display “ALARM TEST” and the audible and visual alarms will turn on for five seconds. After five seconds, the alarms will turn off.

### ALARM CONDITIONS

If the Service Pro ISC control center detects an abnormal condition, the display will indicate the specific problem the system is experiencing. For example, if the aerator is drawing high amps, the display will read “AERATOR HIGH CURRENT.” To silence the alarms and attempt to clear the alarm condition, press the “RESET” button. If the issue has been corrected, the system will turn off the alarms and resume normal operation. If a problem still exists, the audible alarm will be silenced for 48 hours, but the visual alarm will continue to light. In addition, detailed information regarding the specific problem will be displayed on the screen.
BIO-KINETIC® WASTEWATER TREATMENT SYSTEM

AERATOR INSTALLATION

Installation of the aerator and Bio-Kinetic system should take place when the Singulair system is ready for start-up. Refer to the Bio-Kinetic System Installation instructions for additional details. Your delivery truck driver should have instructed the contractor or owner to contact your office and make arrangements for equipment installation to coincide with occupancy and sanitary sewer use. Review your Singulair tank setting records weekly to insure that you do not have equipment installations that are overdue. If you suspect that adequate time has passed for system start-up and you have not yet heard from the owners, contact them to schedule equipment installation. For Singulair Bio-Kinetic wastewater treatment systems requiring more than one aerator installation, follow these instructions for each aerator to be installed.

PRE-INSTALLATION CHECKLIST

✓ The installer should have accurate directions to the facility and a list of service inspections due at other installations in the vicinity.
✓ The service vehicle should carry the Bio-Kinetic Tool Kaddy fully stocked with tools, spare parts and test equipment for use during installation.
✓ Someone should be present at the location to allow installer access to the control center and electrical service panel.
✓ The main electrical service panel wiring must be complete so each aerator may be started-up and tested.
✓ All chambers of the Singulair tankage should be full to the flow line.
✓ A Bio-Static sludge return should have been installed in each opening in the aeration/clarification chamber wall.
✓ The installer must have the proper model and quantity of aerators for the installation.
✓ The serial number on each aerator must match the service and warranty record card.

AERATOR START-UP PROCEDURE

When you arrive on site, introduce yourself to the owner and ask to see the main electrical service panel and Singulair control center. Be certain each circuit for the Singulair system in the main electrical service panel is de-energized and that the selector switch in the Service Pro control center is placed in the “off” position. Explain to the owner that you will be installing the aerator in the tank and you will need access to the main electrical service panel for system start-up after the aerator has been installed. Carry the aerator in its shipping carton to the tank site. Place the Singulair Bio-Kinetic Tool Kaddy nearby for easy access to tools and test equipment. Remove the vented cover from the aerator mounting casting. Carefully remove the aspirator shaft from the shipping carton. Do not bump or bend the aspirator shaft. Lay the shaft on the vented cover. Grip the outside bottom of the shipping carton with your feet and lift the aerator to remove it. Lay the aerator on its side with the brackets resting on the vented cover near the aerator mounting casting. Uncoil the underground electrical service cable from inside the aerator mounting casting and extend it out of the casting. Test the exposed leads with the electrical multi-meter from the Tool Kaddy before proceeding. The circuit should not be energized and voltage should not be evident when the leads are tested with the multi-meter.

WIRING THE ELECTRICAL CONNECTOR

The moisture resistant electrical connector must be properly wired to insure system operation and protect components. Carefully follow these steps to completely wire the electrical connector:

1. Uncouple the two halves of the electrical connector on the Singulair aerator. Unscrew the three captive stainless steel screws from the face of the female half of the assembly. They will stay in the body of the receptacle. Lift out the rigid internal receptacle body.
2. Unscrew the compression nut on the strain relief connector assembly at the small end of the female half of the connector. Do not misplace the compression ring. Insert the electrical service cable through the compression nut, compression ring and neoprene grommet, which is contained in the molded plastic sleeve of the female connector.
3. Strip the outer insulation back 1 1/4” on the underground electrical service cable and expose the three individual leads. Use extreme care to be sure the insulation jackets on the individual black and white leads are not scarred or damaged while stripping the outer jacket. Check them carefully. If even slight damage is noticed, cut off the end of the cable just below your work and begin again.
AERATOR INSTALLATION (Cont.)

ASPIRATOR SHAFT INSTALLATION

Each Singulair aerator is manufactured and tested to a critical straightness tolerance from the aerator motor to the aspirator. Remember that the operating life of the aerator often depends on the straightness of the aspirator shaft. It must not be bumped or allowed to contact anything except the aeration tank liquid.

1. With the Singulair aerator lying on its side and the brackets propped up on the vented cover, rotate the foam restrictor until the stainless steel set screws in the intermediate shaft are facing up.
2. Loosen the two set screws that are located closest to the foam restrictor.
3. Examine the upper end of the aspirator shaft and locate the alignment mark permanently affixed during factory testing. Insert the aspirator shaft into the intermediate shaft so that the alignment mark on the aspirator shaft meets the corresponding mark on the intermediate shaft. Be sure both set screws have been loosened before inserting the aspirator shaft. The aspirator shaft must be fully inserted to the depth of the stop shoulder that has been machined in the outside of the aspirator shaft. Use a tee-handle allen wrench to tighten both set screws finger tight only. Overtightening may dish the side of the aspirator shaft and compromise the straightness tolerance.

INSTALLATION IN THE MOUNTING CASTING

1. Lower the aerator into the aerator mounting casting carefully to avoid any contact between the aspirator shaft, aspirator tip and concrete side walls.
2. Make sure that the weight of the aerator is evenly distributed on all four mounting brackets and that the brackets are seated in the four precast grooves on the top of the aerator mounting casting.
3. Arrange the underground power cable in the mounting casting so that it does not touch or come into contact with the side of the Singulair aerator.
4. Make sure the blades on the male half of the electrical connector are clean and dry. Plug the two halves of the watertight electrical connector together making sure the multiple lip seal is securely engaged. Arrange the aerator power cord, electrical connector and underground electrical cable around the aerator, and secure them into the mounting clips attached to the aerator upper brackets. Before replacing the aerator mounting casting lid, make sure these electrical connections are not resting against the top of the aerator.

4. Strip off the insulation jackets \( \frac{3}{16} \)" from the ends of the black and white leads.
5. Insert the black lead end into the hole adjacent to the brass-colored screw and tighten the screw securely.
6. Insert the white lead end into the hole adjacent to the silver-colored screw and tighten the screw securely.
7. Insert the bare copper ground lead into the hole that is adjacent to the green colored screw and tighten the screw securely.
8. Inspect your work to see that no two uninsulated leads are in contact with each other and that all screws are tight. Also be sure the wire insulation is not captured in the terminal. All power cable leads must be connected to the correct terminals in the female receptacle for proper aerator operation. The back of the insert body is clear, making it easy to verify that each wire is in place before tightening the terminal screws. Improper wiring or electrical hook-up will void the warranty.
9. Locate the insert key above the grounding pole on the side of the rigid receptacle body and align it with the keyway molded on the inside of the rubber receptacle sleeve. Grasp the connector and insert the receptacle body fully into the sleeve.
10. Engage the three captive stainless steel screws on the face of the receptacle body and tighten them.
11. Press the neoprene grommet onto the small end of the female half of the electrical connector. Tighten the compression nut and clear plastic compression ring against the grommet. The compression nut achieves maximum torque by hand-tightening. Do not over-tighten the compression nut.

NOTE: Any time the female connector is not in use, secure the closure cap in the end of the receptacle.
**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.

**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. If the system is equipped with Blue Crystal or Bio-Neutralizer feed tubes, carefully remove each tube, one at a time. Lay each feed tube on the inverted access cover. Do not allow the feed tubes to touch each other. 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. If the system is equipped with Blue Crystal or Bio-Neutralizer feed tubes, carefully remove each tube, one at a time. Lay each feed tube on the inverted access cover. Do not allow the feed tubes to touch each other. 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 dewatered. Once completely dewatered, remove the Bio-Kinetic system from the mounting casting.

**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. If the system is equipped with Blue Crystal or Bio-Neutralizer feed tubes, carefully remove each tube, one at a time. Lay each feed tube on the inverted access cover. Do not allow the feed tubes to touch each other. 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.
INSTALLATION OF THE BIO-KINETIC® SYSTEM

The Bio-Kinetic system is installed in the final clarification chamber of the Singulair tank. This unique device accomplishes tertiary treatment, flow equalization and, if required by local regulations, effluent disinfection and dechlorination in one compact assembly. The Bio-Kinetic system is recommended for use in direct off-lot discharge applications and any other application where extremely high quality effluent is desirable. Installation of the Bio-Kinetic system can take place as soon as the tank is ready for storage or immediately after the tank is installed in a prepared excavation.

Drain and fill valves built into the Bio-Kinetic system allow it to be installed within the Singulair tank any time after the tank has been poured and stripped. This allows faster Singulair system installation and less time at the installation site. When installing the Bio-Kinetic system before tank delivery, make sure the tank is stored in a level position to avoid stress on the cast-in-place receiving flange, the Bio-Kinetic discharge flange or to prevent damage to the outer chamber filter media.

BIO-KINETIC® SYSTEM PRE-INSTALLATION CHECKLIST

✓ All chambers of the Singulair tank should be full to the flow line with clean hold down water as soon as the tank is placed in the excavation and backfilling begins. When the owner calls for start-up, ask him to check the liquid level in the Singulair system. If the liquid level has not reached the outlet invert, have the owner add clean water until full.
✓ These instructions consider the use of concrete as well as plastic risers and lids. The Bio-Kinetic system access opening pan, designed to accommodate the locking lugs into the tank top, must be used when installing plastic risers over the clarification chamber access opening.
✓ The service vehicle should be fully stocked, including the Norweco Tool Kaddy, Bio-Kinetic lubricant, Blue Crystal disinfecting tablets and Bio-Neutralizer dechlorination tablets.
✓ Make sure the proper quantity and model number of Bio-Kinetic systems for the installation are in the service vehicle. Bio-Kinetic systems may be supplied with or without Blue Crystal and Bio-Neutralizer chemical feed systems. Therefore, check your order and Distributor Service and Warranty Record Card carefully to be sure you have selected the proper quantity of Bio-Kinetic systems with the correct service cover, flow distribution deck and feed tube(s), and that they are properly labeled for the correct model Singulair system.
✓ For Singulair systems requiring multiple Bio-Kinetic tertiary treatment devices, follow these instructions for each Bio-Kinetic system to be installed.

PREPARING THE SINGULAIR TANK

1. Bio-Kinetic system mounting castings or plastic risers should be used for access to the clarification chamber. Additional riser castings or plastic risers may be added as necessary to reach finished grade.
2. When a mounting casting is used, it must be carefully sealed to allow the locking lugs of the Bio-Kinetic system to engage into the groove created when the mounting casting is installed on the tank top. Excess sealant in this groove may prevent the locking lugs from properly engaging. Other sealing procedures for the tank, mounting castings and risers are detailed in Singulair Tank Delivery and Setting instructions.
3. When plastic risers and lids are used to replace the concrete system mounting castings, make sure that the proper access opening pan has been used to create the grooves that are necessary for securing the locking lugs. Seal and secure the plastic risers to the manufacturer's specifications.
4. The Bio-Kinetic system should only be installed in a
concrete mounting casting or plastic riser with a non-vented concrete or plastic cover above it. Do not seal the cover to the mounting casting or plastic riser. All mounting castings, risers and covers must be in place before backfilling the tank to prevent fill material from entering the Singular tank.

5. The proper quantity of Bio-Static sludge returns should have been installed in the aeration/clarification chamber wall when tank delivery and setting was completed. Check to be sure that a Bio-Static sludge return is installed in each of the cast-in opening(s) in the aeration/clarification chamber wall.

6. If the Singular tank is in an excavation, it should already be filled with clean water. The water should be free of dirt, mud, leaves, grit, oils or other materials that might possibly interfere with operation of the system. The tank should be filled with water inside, at the same time it is backfilled outside, to reduce stress on the precast tank. The aeration and clarification chambers will both be filled if the hose is installed in the aeration chamber access opening. The pretreatment chamber should be filled separately through its access opening.

7. Influent and effluent sewer lines must be installed and connected to the system as soon as it is set and before backfilling to prevent entry of mud or debris.

8. When a Singular system is being installed to replace a failed onsite wastewater treatment system, the old septic tank need not be abandoned. However, be sure the Singular system is installed downstream of the old septic tank and that the entire obsolete system is completely pumped and cleaned before the Singular tank is installed. If the owner prefers, the obsolete system may be totally removed or filled in and abandoned in the ground.

9. Check to see that roofing down spouts, footer drains, sump pump piping or garage and basement floor drains are not connected to the sanitary sewer. The Singular system may not operate properly if hydraulic flows greatly exceed the rated treatment capacity. If the facility is equipped with a water softener, locate the backwash discharge line. The backwash line must not be connected to the Singular system.

**BIO-KINETIC SYSTEM INSTALLATION PROCEDURE**

Remove the Bio-Kinetic system from the shipping carton. Lift off the Bio-Kinetic system service cover and set it aside. Use the disassembly tool to remove the internal components and discard the shipping sleeve. Reinstall the internal components. Rotate the round, black locking lugs inward to allow installation.

Use the lifting tool to lower the Bio-Kinetic system into the mounting casting. Be careful to align the discharge flange with the receiving flange that is cast into the tank. The Bio-Kinetic system is equipped with a pressure sensitive valve to aid in the filling process for new systems that are not yet filled and the draining process during service or removal. The fill valve is engineered to open when the pressure

**LOCKING LUG GROOVE**

**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.

**SELF FILL VALVE**

Use the lifting tool to lower the Bio-Kinetic system into the mounting casting. Be careful to align the discharge flange with the receiving flange that is cast into the tank. The Bio-Kinetic system is equipped with a pressure sensitive valve to aid in the filling process for new systems that are not yet filled and the draining process during service or removal. The fill valve is engineered to open when the pressure
outside the Bio-Kinetic system reaches 16 inches of head. When the tank water level reaches 16 inches on the outer chamber of an empty Bio-Kinetic system, the fill valve will open. The valve will remain open until the water level inside the filter reaches 4 inches below the water level outside the filter. At this point, the valve will close. For operation instructions on the drain valve system, refer to “Clarification Chamber and Bio-Kinetic Service.” Carefully guide the system through the center of the opening using the lifting tool. Be sure to maintain the Bio-Kinetic system in a vertical position. If allowed to tilt, the system could rub the edge of the concrete opening and be damaged. **NOTE:** Use the viewing port to be sure proper alignment and engagement of the outlet connection takes place. The discharge flange must engage the top of the cast-in-place receiving flange.

Continue to lower the system until the discharge flange fully engages the receiving flange and the top collar of the Bio-Kinetic system rests on the concrete ledge of the clarification chamber access opening. To confirm that the discharge flange and receiving flange are fully engaged, look through the viewing port in the top collar. Use the locking lug tool to twist each of the round, black locking lugs clockwise, so that each locking lug is positioned directly beneath the concrete lip of the mounting casting.

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 distribution deck should be leveled using the four adjustment lugs provided for this purpose. With the ratchet drive, extension and \(\frac{7}{16}\)" socket from the Tool Kaddy, turn each of the adjustment lugs the minimum amount necessary for the bubble to rest squarely between the two lines in the clear plastic case. 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.
The system service cover can now be placed into position. Install the cover, handle side up, aligning the four holes in the cover with the four locking lug bolts. Be sure the optional chlorination and dechlorination feed tube access openings are in the proper position. 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.

If the installation requires a Blue Crystal disinfection system, the chlorine feed tube opening in the service cover must be positioned on the inlet side of the system nearest the aerator mounting casting. Before handling Blue Crystal disinfecting tablets, carefully read the container label and the “Warning” section of these instructions. To fill the chlorine feed tube, remove the cap, hold the tube (open end down) with one hand and insert Blue Crystal disinfecting tablets, one tablet at time, until the tube is filled. Each tablet must lie flat in the stack. When the tube has been completely filled, replace the cap. Install the feed tube, slotted end down, through the plastic collar molded into the top of the Bio-Kinetic system service cover. The feed tube will begin to engage the round recess in the flow distribution deck. Rotate the tube clockwise until it locks into position.

**NOTE:** The chlorine feed tube must always be installed through the mounting collar nearest the aerator mounting casting. If the installation requires disinfection and dechlorination, there will be two openings in the protective cover. The dechlorination feed tube must be installed nearest the system outlet.

**WARNING**

*Blue Crystal disinfecting tablets are a strong oxidizing agent and highly corrosive. Tablets should be stored in a cool, dry, well-ventilated area away from combustible materials such as paper, petroleum products, chemicals, rags or cardboard. Contact with other liquids or chemicals may cause fire. Wear proper protective equipment when handling Blue Crystal disinfecting tablets or working with the chlorine feed tube. Keep tablets out of the reach of children, as they can cause skin and eye damage, irritate the nose and throat, and may be fatal if swallowed. If on skin, wash with plenty of soap and water for fifteen minutes, call a doctor if irritation persists. If swallowed, immediately drink large quantities of water, do not induce vomiting, avoid alcohol and get medical attention immediately. If inhaled, immediately remove victim to fresh air. In the case of fire, apply liberal quantities of water. It is a violation of Federal Law to use Blue Crystal tablets in a manner inconsistent with the instructions printed on the storage container label.*

If the installation requires a Bio-Neutralizer dechlorination system, the Bio-Kinetic system will be supplied with a dechlorination feed tube. Before handling Bio-Neutralizer dechlorination tablets, carefully read the container label and the “Warning” section of these instructions. To fill the dechlorination feed tube, remove the cap, hold the tube (open end down) with one hand and insert the Bio-Neutralizer dechlorination tablets, one tablet at a time, until the tube is filled. Each tablet must lie flat in the stack. When the tube has been completely filled, replace the cap. Insert the dechlorination feed tube, slotted end down, into the mounting collar closest to the system outlet. The bottom of the tube must come to rest evenly on the floor of the flow deck.

**WARNING**

*Bio-Neutralizer dechlorination tablets must be stored in a cool, dry place away from acids and oxidizers. Do not allow Bio-Neutralizer tablets to come into contact with chlorine tablets. Although not rated a hazardous material by the USEPA, exercise caution when handling and wash skin thoroughly with soap and water if contact occurs.*

Reinstall the Bio-Kinetic system access cover. If a plastic riser and lid are used, secure the plastic lid to the riser using the fasteners provided. Now proceed with the steps outlined in the Singulair System Final Check and System Start-Up instructions.

**SERVICING THE BIO-KINETIC SYSTEM**

Each Singulair installation equipped with the Bio-Kinetic system should be inspected and serviced during each six-month prescheduled service inspection. Refer to the Bio-Kinetic System Service instructions for service procedures and recordkeeping policies.
Immediately following installation of each Singulair aerator and Bio-Kinetic tertiary treatment device, the entire Singulair system should be given a final check and start-up. All tests should be performed to insure equipment is installed and operating properly. After all tests are satisfactorily completed, the selector switch in each control center should be set to the “automatic” position for electro-mechanical panels, or the “on” position for Service Pro control centers. Aerators should not be turned off, even during extended vacation periods. Some model Singulair systems require multiple aerators, control centers and Bio-Kinetic systems. Follow the instructions below for each aerator, control center and Bio-Kinetic system provided.

**CAUTION:** Any time an aerator or electrical 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.

**PRELIMINARY ELECTRICAL INSPECTION**

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

Make sure the circuit breaker which supplies power to the Singulair system in the main electrical service panel is in the “off” position. Open the control center cover and place the selector switch in the “off” position. Proceed to the Singulair system and unplug the watertight electrical connector from the aerator power cord. Secure the closure cap in position on the electrical connector and return to the control center.

**VOLTAGE TEST OF CONTROL CENTER**

If the system is equipped with a Service Pro control center, unplug the power connector from the circuit board. For electro-mechanical control centers, remove the terminal strip insulator. Energize the circuit breaker in the main electrical service panel.

For Service Pro control centers, place one probe of the meter from the Tool Kaddy on the power connector terminal pin attached to the black wire and one probe on the pin attached to the white wire. It should read between 109 and 121 volts. Place one probe of the meter on the terminal pin connected to the red wire and one probe on the pin connected to the white wire. The meter should read zero volts. Once these readings are confirmed, place the selector switch in the “off” position, carefully reinstall the terminal strip insulator and proceed to the aerator.

For electro-mechanical control centers, place one probe of the meter on the terminal marked L1 and one probe on the terminal marked N. It should read between 109 and 121 volts. Place one probe of the meter on the terminal marked A1 and one probe on the terminal marked N. The meter should read zero volts. Once these readings are confirmed, place the selector switch in the “off” position, carefully reinstall the terminal strip insulator and proceed to the aerator.

**VOLTAGE TEST OF AERATOR**

Remove the polarity tester from the Tool Kaddy and insert it into the receptacle of the electrical connector. When the circuit is energized, the polarity tester should indicate proper wiring of the connector and control center. Remove the polarity tester and insert one probe of the multi-meter into each slot of the electrical connector. It should read between 109 and 121 volts. **CAUTION:** Do not energize the Singulair system if an electrical problem is found. Advise the owner and return only when the problem condition has been corrected by a qualified electrician.
SINGULAIR® SYSTEM FINAL CHECK & SYSTEM START-UP (Cont.)

AMPERAGE TEST

Remove the electrical test pigtail from the Tool Kaddy and place the current sensor of the multi-meter around the exposed black lead of the test pigtail. Plug the test pigtail in line between the two halves of the watertight electrical connector. When energized, read the current draw of the aerator. The initial reading should never be greater than 4.2 amps. After 48 hours of operation, break-in of the mechanical seals will allow the amp draw to drop to 3.8 amps or less. If an excessive current reading is obtained, de-energize the aerator immediately and do not re-energize it until the cause is found and corrected. When the test is complete, place the control center selector switch in the “off” position, unplug the test pigtail at both ends and plug the aerator directly into the receptacle on the underground electrical service cable. Make sure the two halves of the connector are firmly engaged to insure the integrity of the multiple lip seal for a moisture proof connection. Place the control center in “continuous” run operation.

AERATOR INSPECTION

Check the aerator to make sure it is running smoothly without vibration. Make sure the four brackets are properly seated in the four cast-in grooves. Arrange the power cord assembly and electrical connector so they are secured in the mounting clips and are not touching the top of the aerator. Confirm that the debris screens are in place in the air intake ports. Replace the vented cover over the aerator mounting casting and check for excessive noise. Listen for evidence of debris in the aeration chamber striking the aspirator shaft. Occasionally, discarded construction materials may enter the sewer line and Singulair tank. They must be removed at once so that the aspirator shaft straightness tolerance is not compromised. Inspect the vent cap openings to assure the unrestricted passage of air.

FINAL INSPECTION OF BIO-KINETIC SYSTEM

Remove the concrete cover from the clarification chamber access opening. Carefully lift out the optional Blue Crystal and Bio-Neutralizer feed tubes and inspect them to make sure they are filled. Carefully lay the feed tubes on the access cover. Remove the Bio-Kinetic system service cover. Inspect the black locking lugs to make sure they are fully engaged beneath the concrete mounting casting. Inspect the level indicator to be sure that the Bio-Kinetic system is installed in a level position to insure proper operation. Replace the system service cover and optional Blue Crystal and Bio-Neutralizer feed tubes, making certain they are correctly positioned. The Blue Crystal feed tube must be positioned in the mounting collar on the inlet side of the system nearest the aerator mounting casting. The Bio-Neutralizer feed tube must be installed in the mounting collar closest to the system outlet. Replace the concrete access cover.

INSPECTION OF EFFLUENT DISPOSAL SYSTEM

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

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

WHEN YOUR INSPECTIONS ARE COMPLETE

Place the selector switch in the Service Pro control center in the “automatic” or “on” position, depending upon the model. Latch the control center cover and secure it with a tamper evident seal. Notify the owner that the Singulair system is operating properly. Ask if there are any questions regarding system operation. Most start-up problems are caused by improper or incomplete installation of the system or because of a misunderstanding on the part of the contractor or owner. Refer to the Singulair Troubleshooting guide for direction if a problem is discovered during start-up.
When the initial start-up of the Singulair Bio-Kinetic system has been completed, take a few minutes to review the system and its operation with the owner. Although no owner maintenance is required, several precautions should be taken to insure maximum performance of the system. Emphasize the continued benefits and protection available through the three year limited warranty, prescheduled service inspections and lifetime aerator exchange program which have been included in the purchase of the Singulair system. These instructions, used with a review of the Owner’s Manual, will give the owner a basic understanding of the Singulair Bio-Kinetic wastewater treatment system.

PRESCHEDULED SERVICE INSPECTIONS

During the initial two years after purchase, service inspections will be made on a semi-annual basis to insure proper system operation. Written reports on the condition of the equipment and quality of the effluent will automatically be made to the owner and to the local health department. Costs for travel and labor during this period are included in the purchase price of the Singulair system. If emergency service covered by the warranty is needed during the first two year period, it will also be provided at no additional owner expense.

CONTINUOUS OWNER PROTECTION PROGRAM

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

NO OWNER MAINTENANCE

No owner maintenance is required on the Singulair aerator, electrical controls or Bio-Kinetic tertiary treatment device. System operation and individual components will be thoroughly checked by the service technician during each routine service inspection. The aerator motor is factory lubricated for the life of the unit. The Bio-Kinetic system contains a six-month supply of Norweco Blue Crystal disinfecting tablets and Bio-Neutralizer dechlorination tablets, if local environmental regulations require these items. The Singulair control center has no user-serviceable parts inside and is secured with a tamper evident seal. Disassembly of any component part will void the limited warranty. Instruct the owner to contact the local distributor with questions and service requests.
FINAL OWNER INSTRUCTIONS (Cont.)

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

1. The Singulair control center should be checked daily. If the red warning light is glowing and the audible alarm sounding, depress the reset button on the control center cover. The light should go off and the audible alarm should be silenced. If the alarms activate again, call the local distributor for service.

2. Check the fresh air openings in each vented cover monthly to make sure the passage of air into the Singulair tank has not been restricted.

3. Inspect the effluent discharge point and ground water relief point monthly to make sure there are no restrictions to the effluent flow.

4. Make sure the pretreatment chamber is inspected at least every three years. Have it pumped only when necessary. See Singulair Tank Pumping instructions to determine when pretreatment chamber pumping is required.

FOR BEST RESULTS

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

Always

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

Never

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

BEFORE LEAVING THE SITE

Remind the owner that the limited Warranty Registration Card must be filled in and mailed as soon as possible. Explain that your company’s telephone number is found on the Service Pro control center. Offer to remove and return the Warranty Registration Card for the owner. Have them sign the card and return it to your office to be mailed to Norweco. As you leave, remind the owner to call your office if any questions arise.
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. To utilize all features of the website, pop ups must be allowed. Refer to your Internet browser provider for specific instructions to allow pop ups. 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 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 the field. Drop down lists 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.

**NOTE:** 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:
   - **Add New Subscriber** - Add new subscriber to the monitoring system by entering the subscriber’s location, Singulair system, accessories, permit and service contract information.
   - **View/Edit Subscriber** - View or edit subscriber’s account and system information.

2) **History**
   This area is where historical information about an account is stored and accessed. At the request of the distributor, regulatory officials may gain access to this area for accounts that are within their jurisdiction. The subsections of this area are:
   - **Specific Account** - Obtain information regarding a specific subscriber.
   - **All Active Accounts** - View history information for all active subscribers.
   - **All Suspended Accounts** - View history information for all suspended subscribers.

3) **Suspend/Restore/Archive** - Stop and reactivate remote monitoring to a system or archive an account that is no longer needed.

4) **List Accounts** - Search and sort subscribers by one of the account categories listed below:
   - Monitored Accounts - Accounts that are connected to a telephone line for remote monitoring.
   - Suspended Accounts - Accounts that are temporarily inactive.
   - Records Only - Active Accounts - Accounts that are not connected to a telephone line, but tracked for service.
   - Records Only - Inactive Accounts - Accounts that are not remotely monitored or under a service contract, but maintained for future reference.
   - Archived Accounts - Accounts that are marked for deletion.
   - All Accounts - All accounts regardless of status.

5) **NOTE:** The results will appear in a report format that can be sorted by any column header. Reports can be viewed, printed or downloaded.
NOTE: The information accessed in each of these categories can be specific to certain types of history by clicking on the circle next to ‘Service History Only’, ‘Alarm History Only’ or ‘All History’. The account history can also be viewed for a specific time period by clicking on the circle next to ‘Past Month’, ‘Past 6 Months’, ‘Past 24 Months’ or ‘Complete History’.

3) Reports
This area is where service information is entered, stored and accessed. Regulatory officials may be granted access to this area for accounts that are within their jurisdiction. The subsections of this area are:

A) Add Service Report - Enter a service report for a specific subscriber account.
B) Add Comment - Record a comment regarding the system.
C) Alarm State - View list of all subscriber systems currently in alarm state including a description of the alarm condition.
D) Systems Due for Service - View list of subscriber systems due for service. Select the accounts to list by clicking on the box next to ‘Overdue’, ‘Due in 30 Days’, ‘Due in 60 Days’ or ‘Due in 90 Days’.
E) Expiring Contracts - View list of service contracts due to expire. Select the accounts to list by clicking on the box next to ‘Expired Contracts’, ‘Due in 30 Days’, ‘Due in 60 Days’ or ‘Due in 90 Days’.
F) Missing Agreements - View list of subscriber systems that are missing monitoring agreements.

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) Service Pro Specifications - Download the Service Pro Control Center Specifications.
C) General Service Form - Download the pre-printed Singularir Bio-Kinetic Wastewater Treatment System Record of Service Performed form.
D) Contract Renewal Form - Download the standard Singularir Service Contract.
E) Service Pro Quick Start - Download the Service Pro Quick Start Guide for an overview of the control center functionality.
F) TNT Service Pro Quick Start - Download the TNT Service Pro Quick Start Guide for an overview of the control center functionality.

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

A) Distributor - Edit and view distributor’s contact information and Service Pro alarm notification method.
   - Edit Distributor
   - View Distributor
   - List System Status
B) Service Provider - Enter, edit and view service provider’s contact information and Service Pro alarm notification method.
   - Add New Service Provider
   - Edit Service Provider
   - View Service Provider
   - List Service Providers
   - List System Status
C) User Internet Access - Enter, edit and view service provider and subscriber login name and passwords.
   - Service Provider Password
   - Subscriber Password

HORIZONTAL HEADER
The horizontal header is 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 - Directs the user to the Search Accounts page. Provides user easy access to search and sort subscriber accounts.
B) Service Due - Directs the user to a list of subscriber accounts that are due for service.
systems due for service within selected time periods. Results can be sorted by any column header.

C) **Panel Info** - Directs the user to 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** - Directs the user to a list of subscriber systems currently in alarm state. Results can be sorted by any column header.

E) **Frequently Asked Questions (FAQ)** - Directs the user to a list of questions frequently asked by distributors, regulators, service providers and system owners. Click the left mouse button while the cursor is over the desired question. The answer to the desired question will display.

F) **Norweco.com** - Directs the user to the Norweco website home page.

**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](http://www.servicepromcd.com) start up page.

B) **Contact Us** - Automatically initiates an email correspondence direct to Norweco. Type in your desired question and send the email. A Customer Service representative will respond promptly.

C) **Help** - Provides 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** - Formally exits the Service Pro website data fields. The login page will be displayed.

**QUICK ACCOUNT SEARCH**

The Quick Account Search box is located on the right side of every screen. The box displays the current account number selected, subscriber name, subscriber address and subscriber account 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](http://www.servicepromcd.com)".
3. Press the enter key. The Service Pro Log In page will be displayed.
4. Type the user name provided by Norweco in the ‘User Name’ field. Press the tab key or click in the ‘Password’ field.
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 ‘select 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 completed before moving to the next screen.

5. Enter the subscriber’s name, address and contact information into the fields provided.
6. The Location Details data fields are optional fields for use in further identifying the location of the system.
7. Next, if the mailing address is the same as the installation address, click the check box titled ‘Same as above’.
GETTING STARTED WEBSITE INSTRUCTIONS (Cont.)

8. If the mailing address is different than the installation address, enter the correct mailing address in the data fields provided.

9. Next are data fields pertaining to the Singulair System. For the installation type, select ‘Residential’ or ‘Commercial’. Select the installation date and system start-up date.

10. Indicate whether the Singulair system is remotely monitored by choosing ‘Yes - phone line is connected’ or ‘No’ and indicate if the monitoring agreement has been received. The monitoring start date and scheduled monitoring renewal dates are automatically displayed.

   NOTE: Selecting ‘Yes - phone line is connected’ will initiate the start of the monitoring service billing period. For systems that will be monitored at a future date, select ‘No’. Once monitoring should begin, use ‘view/edit subscriber’ to update the system to ‘Yes - phone line is connected’.


12. Key in the appropriate aerator serial number and select the correct model from the drop down list; ‘206C’, ‘780’, ‘93’, ‘95’, ‘96’ or ‘Other’. If ‘Other’, key in the appropriate aerator model. Enter the ‘Control Serial Number’ and select the correct ‘Control Model’ from the drop down list; ‘Service Pro’ or ‘Other’. If ‘Other’, key in the appropriate control model.

13. Select up to three auxiliary alarms that are connected for remote monitoring. The drop down list includes ‘ChemCheck’, ‘Effluent Pump’, ‘None’, ‘PostAir Pump’, ‘UV Disinfectant Device’ and ‘Other’. If ‘Other’, key in the type of auxiliary to be monitored.


15. Permit information data fields are used to enter the permit number and date.


17. Enter the duration, in months, between maintenance visits in the ‘Maintenance due every___months’ field.

18. Record any additional notes in the last field.

19. Click the blue Submit button.

20. Adding the new subscriber is complete and remote monitoring will begin.

DOCUMENTATION

To initiate Service Pro remote monitoring, the Subscriber Monitoring Agreement must be completed and signed by the property owner. The agreement is a one page, five part carbonless form. Remote monitoring will begin when the new subscriber has been entered into the Service Pro website, the Singulair system is started up and the Service Pro control center is commissioned and three copies of the signed agreement are received by Norweco. The information on the agreement should be used to complete the new subscriber account on the Service Pro website and register the aerator and control center warranty.

Each new subscriber must sign a 24 month monitoring agreement. If the monitoring agreement is not received by Norweco within 60 days of the new account being commissioned, the account will be suspended until the monitoring agreement is received. To insure continuous monitoring, agreements are automatically renewed. Initial and renewal Singulair service contracts should include the cost to provide the Service Pro monitoring service.

NOTE: The Service Pro website should be book marked in all Internet browser programs to facilitate easy access.
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 aerator 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 aerator. 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 SINGULAR AIR 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
**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 lifetime exchange program to receive a new aerator, the three 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.

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

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

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

www.norweco.com
To maximize owner protection, the Singulair Bio-Kinetic wastewater treatment system is backed by a three year limited warranty on system components and a lifetime 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 initial two year period, be sure to explain to the owner that they are being performed at no charge and that the same coverage can be renewed on a continuing basis at a nominal charge following the initial two year program. Point out the advantages of continuous protection with the service contract. Be sure to remember that service contract sales have advantages for the distributor as well. They result in more efficient service inspection scheduling with more actual “service time” and less “travel time” per day. These savings can be passed on to the owner through more attractive renewal contract fees in future years.

All of the equipment and tools needed for 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 Troubleshooting Guide.
NORWECO PRESCHEDULED SERVICE INSPECTIONS (Cont.)

Before you leave your plant

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

When you arrive at the site

- Meet the owner. Introduce yourself and present your business card.
- Explain the service inspection program and outline what you will do. Mention that your services are at no charge.
- Ask for permission to inspect the 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. Make sure the panel is turned on and the power indicator light is on. If there are any alarm lights activated, refer to the Singulair quick start guide for further diagnostic instructions.

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 turned on and there are no active alarms. 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.
INTRODUCTION

The biological processes in the aeration chamber of the Singular system convert wastewater to microorganisms, carbon dioxide and water. The Singular system is designed so that the aerator will operate 30 minutes out of each hour. Under typical organic loading conditions, this run cycle will maintain a balance between organic loading and the level of microorganisms in the aeration chamber. If an increase in organic loading occurs, increasing the aerator run time will result in additional aerobic digestion and allow the biological balance to be maintained. Prior to adjusting the aerator run cycle, a complete Singular system service inspection, including pretreatment chamber evaluation, aerator service and measurement of air delivery must be performed. Whenever the pretreatment chamber is pumped, the system should be given time to achieve a biological balance before considering time cycle adjustment. Adjustments to the aerator run cycle should not be made within one week of any other system process changes, including system pump out or extended vacation.

NITRIFICATION AND DENITRIFICATION

Nitrification is the oxidation of nitrogen compounds (primarily ammonia) that results in the production of nitrates. This process improves the quality of the effluent returned to the environment and is an important step in wastewater treatment. Nitrification is routinely performed by the Singular system and the level of performance is directly linked to biological balance within the system.

Denitrification will only occur if nitrification has already taken place. Denitrification is the process of breaking down nitrates into oxygen and nitrogen. The Bio-Static sludge return prevents denitrification (sludge bulking) in the clarification chamber by continuously returning solids to the aeration chamber. Denitrification will occur in the aeration chamber if the aerator time cycle is properly adjusted. To accomplish denitrification, the aerator off cycle must be long enough to allow the aerobic bacteria to consume the available dissolved oxygen and the nitrate bound oxygen, thereby returning the nitrogen to its natural state. It is important that the aerator have a long enough off cycle to deplete dissolved oxygen levels in the aeration chamber in order to achieve partial or total denitrification.

SETTLEABLE SOLIDS TEST

To determine if an adjustment to the aerator run cycle is required, a Settleable Solids Test must be conducted. See Singular Tank Pumping Instructions for details on performing this test. Too much air being introduced to the system (overaeration) will negatively affect operating characteristics. This condition is indicated by finely divided particles and/or crisp, white foam floating in the Settleable Solids Test or aeration chamber. The supernatant will be turbid (cloudy) with fine suspended particles (pin floc). Solids will be lighter brown, almost white, in color. Overaeration will not allow proper settling of the treated wastewater and may adversely affect system performance. Likewise, too little air being introduced to the system (underaeration) will cause the system to operate at less than its maximum efficiency. Underaeration is indicated by darker and more coarse solids in the Settleable Solids Test or aeration chamber and may have a dark, thick foam or scum layer on the top. This condition is similar in appearance to organic overloading and the system may have a foul or septic odor. The supernatant will have a grey, almost dishwater, appearance. Solids will have a grainy appearance and will settle more compactly due to their thickness and greater density.

To check for nitrification during the Settleable Solids Test, allow the sample to sit undisturbed for 2 to 3 hours. The nitrogen (fine bubbles) being released should cause all or a portion of the solids to float to the top. This process is called sludge bulking and is actually denitrification occurring in the sample container. The solids may then break up and settle to the bottom of the sample. For Singular systems with more than one aerator, the Settleable Solids Test should be conducted on a sample from each aeration chamber. The results of all tests should be averaged to evaluate system operation.
The results of the Settleable Solids Test should be evaluated using the following chart:

<table>
<thead>
<tr>
<th>Color of Solids and Liquids</th>
<th>Settled Solids Volume</th>
<th>Additional Observations</th>
<th>Condition Indicated</th>
<th>Adjustment Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very light brown solids with gray cloudy liquid.</td>
<td>Less than 25%.</td>
<td>Some surface foam. Poor separation and settling of solids.</td>
<td>Hydraulic overloading, organic underloading, or system has not yet reached process maturity.</td>
<td>No adjustment until process maturity is reached. If mature and properly loaded, decrease aerator run time. DO NOT decrease run time to less than 30 minutes per hour.</td>
</tr>
<tr>
<td>Light to medium chocolate brown solids with clear liquid.</td>
<td>25% to 50%.</td>
<td>No foam.</td>
<td>Proper operation.</td>
<td>None.</td>
</tr>
<tr>
<td>Medium to dark chocolate brown solids with clear liquid.</td>
<td>50% to 75%.</td>
<td>No foam.</td>
<td>Proper operation.</td>
<td>None.</td>
</tr>
<tr>
<td>Very dark brown solids with cloudy brown liquid.</td>
<td>Greater than 75%.</td>
<td>Dense sludge with rapid settling.</td>
<td>Organic overloading.</td>
<td>Evaluate pretreatment chamber. Increase aerator run time if required.</td>
</tr>
</tbody>
</table>

**DISSOLVED OXYGEN TEST**

A dissolved oxygen (DO) test can be conducted on the aeration chamber contents to confirm overaeration or underaeration. The DO test can be performed on site using a properly calibrated portable DO meter with probe. The DO level can also be accurately determined through the use of an inexpensive colormetric test performed on a properly filtered sample from the aeration chamber. DO in the aeration chamber typically ranges from 0.5 mg/L to 9.5 mg/L and fluctuates according to cycle time and other factors including temperature and solids level. Comparison samples must be taken at the same point during the aerator run cycle because DO levels will vary according to cycle time. DO levels in the aeration chamber must be greater than 2.0 mg/L at the end of the aerator run cycle to accomplish nitrification and less than 0.5 mg/L at the end of the aerator off cycle to accomplish denitrification. A properly balanced system will have more than sufficient air during the run cycle to allow nitrification to take place and will deplete DO during the off cycle sufficiently to allow partial or complete denitrification. Some areas have specific DO requirements for effluent returned to the environment and the same tests can be conducted on final effluent samples. The treatment processes of the Singulair system will cause effluent DO to differ from aeration chamber DO levels. Typical effluent DO will range from 1.0 mg/L to 6.0 mg/L depending on location, temperature and time of year.

**HYDRAULIC OVERLOADING**

Hydraulic overloading of the Singulair system is an indication that too much liquid is coming into the plant. This situation can adversely affect biological treatment and should be corrected immediately. Leak testing should be performed on toilets, faucets and other fixtures that discharge into the domestic wastewater plumbing to be sure that they shut off completely when not in use. Confirm that roofing down spouts, sump pump piping and other improper connections are not discharging into the Singulair system. Crushed or leaking influent sewer lines can cause groundwater to enter the system and should be thoroughly checked by a qualified contractor.

**ORGANIC OVERLOADING**

The Singulair system is designed to handle typical domestic waste. Occasionally, a specific application may result in excessive organic loading to the system. If you encounter an organic overload, the aerator run cycle can be adjusted in five minute increments up to continuous run. Instruct the owner regarding proper use of the system as described in the Singulair Owner’s Manual.
HIGH ALTITUDE INSTALLATIONS

The Singulair aerator delivers more than 150% of the air required by nationally recognized wastewater treatment design standards. This abundant supply of air allows the Singulair system to be installed at high elevations without special consideration. At an elevation of 6,500 feet above sea level, the available oxygen is approximately 23% less than at sea level. In high altitude installations, adjustment to the aerator run cycle should be made based on the same evaluation procedures used for all Singulair systems.

INTERMITTENT USAGE

When the Singulair system is to be used intermittently (one day per week or a few days per month), the aerator run cycle should be adjusted to the minimum setting. When low usage or non-use periods are expected, precautions should be taken to insure the protection of system components. If an extended period of non-use (four months) is anticipated, the distributor should suggest complete system shut down and removal of components. This may only be done with the full knowledge and approval of the local regulatory agency. The final decision to shut down the system rests with the owner. The decision should be based on the same criteria as other seasonal or non-occupancy arrangements, such as care of hot water tanks, water pipes, refrigerators or freezers. The owner should arrange for the local distributor to remove and store the aerator and chemical feed tube(s) after vacancy. The service technician should place the control center selector switch in the “off” position. Arrangements must be made for the distributor to re-install Singulair system components before the site is to be re-occupied. Normal installation procedures, as outlined in the Singulair Service Manual, should be followed by the distributor when re-starting a system.

COMPLIANCE WITH REGULATIONS

Local regulatory officials must be informed whenever a time cycle adjustment is made. Regulatory agencies should participate in the adjustment decision and standard procedures should include consultation with regulators before any adjustment is made. Norweco distributors and service personnel should attempt to build and maintain a close relationship with regulatory officials. Consulting with regulators and owners before adjusting a Singulair time clock should strengthen communication and keep all parties properly informed. In instances where a close working relationship already exists with local regulatory officials, regulators may allow service personnel to submit notification after an adjustment has been made. Such a practice should only occur when a strong relationship exists between distributor and regulator and with the full knowledge and approval of the regulatory agency.

PRIOR TO SYSTEM ADJUSTMENT

The Service Pro control center is designed and manufactured to provide an aerator run cycle of at least 30 minutes per hour. The aerator run cycle can be adjusted, but in no case can the aerator operate less than 30 minutes per hour.

Use the Singulair flowmeter to determine that the proper amount of air is being introduced into the system. If the flowmeter confirms that the Singulair aerator is infusing the proper amount of air, proceed with the Settleable Solids test. Should the Settleable Solids or Dissolved Oxygen tests indicate that a time cycle increase is desirable, turn the Service Pro control center time clock dial to the “continuous” position. Allow the system to operate on “continuous” run for a few weeks until the service technician is available to check the system and speak with the owner. If the system has not returned to normal operation, the system is experiencing a problem other than with the time cycle and alternatives must be investigated. Refer to the “Hydraulic Overloading” and “Organic Overloading” sections of these instructions.

If the change to “continuous” run has solved the operational problem, the time clock should be adjusted to bring the system into biological balance. When the service technician returns to the site, and operation has returned to normal, the technician should adjust the time clock to reflect the deviation in loading from the original time clock setting. Adjust the aerator run cycle to half way between “continuous” run and the original time clock setting (e.g. if the original setting was 30 minutes, adjust the time cycle to 45 minutes out of each hour). Instruct the owner to monitor the system and notify you of any problems. After at least one month, when a service technician is available and in the geographic area, check the system again. Additional adjustments may be necessary to completely balance the system.
TIME CLOCK SETTING AND SERVICE INSTRUCTIONS (Cont.)

TIME CLOCK ADJUSTMENT

NOTE: Use a small blade screwdriver to rotate the time clock dial to the desired position. Do not use excessive force when turning the time clock dial.

Singular systems with more than one aerator must have all control centers set for the aerators to operate on identical run cycles. Follow these steps to adjust the time clock:

1. Open the control center enclosure and place the selector switch in the “off” position.
2. Rotate the time clock dial clockwise until the arrow molded into the dial is aligned with the desired run time setting.
3. Place the selector switch in the “on” position.
4. Close the control center cover and secure it with a tamper evident seal.
5. Record the new aerator run cycle on the Service Inspection Card.

SERVICE INSTRUCTIONS

The operation of the Service Pro control center can be verified on site through a series of tests. Before testing the Service Pro control center operation, insure the aerator is installed in the Singular tank and the watertight electrical connector is plugged into the aerator power cord. To restart the aerator time clock cycle, place the selector switch in the control panel momentarily in the “off” position. Return the selector switch to the “on” position. The aerator should now be operating.

Allow the aerator to operate for 60 seconds before proceeding. If the aerator turns off or the alarms on the control center activate, an aerator over current condition has been detected or a problem has been detected in the Service Pro control center.

To test the aerator under current detection feature, simply unplug the watertight electrical connector from the aerator power cord. The visual alarm indicator on the control center should begin to flash within five seconds. Plug the electrical connector into the aerator power cord. The aerator should resume normal operation within five minutes and the visual alarm indicator on the control center will turn off.

To test the audible and visual alarms, hold the reset button in for five seconds. The alarms will activate for a five second period and then turn off.

Should the Service Pro control center require any service, replace the entire control center insert.

CAUTION: Be sure to shut off the Singular circuit breaker in the main electrical service panel before any repairs are made. Confirm that the incoming electrical service reads zero volts before proceeding with control center insert replacement. Refer to Control Center Wiring and Installation Instructions for details on replacement of the control center insert.
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 push the reset button on the Service Pro panel.
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.
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 Card.

27. Proceed with clarification chamber service as outlined in Clarification Chamber and Bio-Kinetic Service instructions. When the 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 three-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.
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.

2. Lift off the concrete clarification chamber access cover(s) and turn it (them) upside down near the access riser. If the unit is equipped with Blue Crystal or Bio-Neutralizer feed tubes, carefully remove each tube, one tube at a time. Lay each feed tube down on the concrete access cover. 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 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.

CAUTION: Chemicals or liquids from the Bio-Kinetic system feed tubes should not be allowed to contact skin or clothing. Refer to the Blue Crystal and Bio-Neutralizer handling instructions and container labels for safety procedures and first aid. Liquids or chemicals from the feed tubes may cause grass or landscaping to discolor.

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 Bio-Kinetic lubricant. 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 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 Card and on the "Supplementary Service" section of the Owner's Manual. Make appropriate notations on the condition 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 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.

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.

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.

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.

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 troubleshooting 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.

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 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.

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 Singular 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. Be sure the optional chlorination and dechlorination feed tube access openings are in the proper position. 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.

23. If the installation requires effluent disinfection, the chlorine feed tube opening in the service cover must be positioned on the inlet side of the system nearest the aerator mounting casting. The Bio-Kinetic system chlorine feed tube should be filled with Norweco Blue Crystal disinfecting tablets. Blue Crystal tablets have been specially formulated for use in the Bio-Kinetic system, other disinfecting chemicals will not provide the same results. Before handling Blue Crystal disinfecting tablets, carefully read the container.

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.
label and the “Warning” section of these instructions. To fill the chlorine feed tube, remove the cap, hold the tube open end down with one hand and insert Blue Crystal disinfecting tablets, one tablet at a time, until the tube is filled. The tube holds approximately a six-month supply and each tablet must lie flat in the stack. When the tube has been completely filled, replace the cap. Install the feed tube, slotted end down, through the plastic collar molded into the top of the Bio-Kinetic system service cover. The feed tube will begin to engage the round recess in the flow distribution deck. Rotate the tube clockwise until it locks into position.

NOTE: The chlorine feed tube must always be installed through the mounting collar nearest the aerator mounting casting. If the installation requires disinfection and dechlorination, there will be two feed tube mounting collars molded into the protective cover. The dechlorination feed tube must be installed nearest the system outlet.

WARNING

Blue Crystal disinfecting tablets are a strong oxidizing agent and highly corrosive. Tablets should be stored in a cool, dry, well-ventilated area away from combustible materials such as paper, petroleum products, chemicals, rags or cardboard. Tablets should be mixed only with water. Contact with other liquids or chemicals may cause fire. Wear rubber gloves and either safety goggles or a face shield when handling Blue Crystal disinfecting tablets or working with the chlorine feed tube. Keep tablets out of the reach of children, as they can cause skin and eye damage, be irritating to the nose and throat, and may be fatal if swallowed. Avoid breathing dust and do not allow contact with eyes, skin or clothing. Contaminated clothing should be removed and washed before reuse. If tablets or residue contact skin, wash with plenty of soap and water for fifteen minutes. If irritation continues, call a physician. If swallowed, immediately drink large quantities of water, do not induce vomiting, avoid alcohol and get medical attention immediately. If inhaled, immediately remove victim to fresh air. In case of fire, apply liberal quantities of water. It is a violation of Federal Law to use Blue Crystal disinfecting tablets in a manner inconsistent with the instructions printed on the storage container label.

24. If the installation requires effluent dechlorination, the Bio-Kinetic system will be supplied with a dechlorination feed tube. To fill the dechlorination feed tube, remove the cap, hold the tube open end down with one hand and insert the Bio-Neutralizer dechlorination tablets, one tablet at a time, until the tube is filled. The tube holds approximately a six-month supply of tablets and each tablet must lie flat in the stack. Replace the cap and insert the dechlorination feed tube, slotted end down, into the mounting collar closest to the system outlet. The bottom of the tube must come to rest evenly on the floor of the flow distribution deck.
CLARIFICATION AND BIO-KINETIC® SERVICE (Page 6 of 6)

WARNING

Bio-Neutralizer dechlorination tablets must be stored in a cool, dry place away from acids and oxidizers. Do not allow Bio-Neutralizer tablets to come into contact with chlorine tablets. Although not rated a hazardous material by the USEPA, exercise caution when handling and wash skin thoroughly with soap and water if contact occurs.

25. Reinstall the clarification chamber access cover. If the installation requires effluent disinfection and/or dechlorination, note the quantity of tablets installed on the Service Inspection Card in order to properly invoice the customer for the appropriate chemical tablets. Clean and store all tools and supplies.

26. When the service is complete, return the selector switch in the control center to the proper time cycle position. Close the cover of the control center enclosure and secure it with a new tamper evident seal.

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 on lot. Inspect the condition of the effluent disposal system and make appropriate notations on the Service Inspection 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 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 Troubleshooting guide.

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

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

BEFORE YOU LEAVE THE FACILITY...

1. Make sure that both sides of all three Service Inspection Cards are properly and completely filled out, including any specific notes or special services that your inspection indicates are needed.

2. Leave the top section of the Service Inspection Card with the owner and provide a brief verbal explanation of the condition of the system. Advise when to expect your next routine visit and provide your business card with office phone number, should the owner have any questions.

3. Point out the advantages of a continued service policy 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 Service Pro control center with the owner. Inform the owner that the control center should be checked daily to insure proper system operation. Explain that if the light glows and the alarm sounds, it could be due to temporary high water or electrical power fluctuation and that the reset button should be pushed to see if normal operation is resumed before requesting special service.

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

**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 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 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.
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.

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.
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.

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.

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.
BIO-KINETIC® WASTEWATER TREATMENT SYSTEM

TROUBLESHOOTING

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

PLEASE NOTE:

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

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

- 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 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 TROUBLESHOOTING

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.
TROUBLESHOOTING (Cont.)

SEPTIC ODOR IN SINGULAIR SYSTEM

Aerator turned off
Insufficient air delivery by aerator
Aspirator shaft plugged with deposits
Aspirator orifices plugged with deposits
Water softener backwash discharging into system
Circuit breaker tripped
Improperly sealed pretreatment chamber access cover
Vent cap openings restrict fresh air entry
Incomplete treatment due to hydraulic overloading
Periodic septic odor for no reason

Place control center selector switch in “automatic” position
Service aerator
Remove from aerator and flush with shaft cleaning hose
Remove deposits
Have owner remove backwash line from system
See “Control Center Warning Light Glows/Audible Alarm Sounding”
Seal pretreatment access cover
Clean vent cap openings
See “Hydraulic Overloading”
Have sanitary sewer vent checked

HYDRAULIC OVERLOADING OF SINGULAIR SYSTEM

Ground water entering system through tank joint
Ground water entering system through crack in side wall
Ground water entering system through defective seal at inlet or outlet line
Roofing down spouts, footer drains, sump pump piping or garage and basement floor drains tied into Singulair system influent line

Excavate and seal with non-shrink grout
Excavate and patch with non-shrink grout
Excavate and reseal piping as needed
Have contractor relocate improper connection downstream of Singulair system

ORGANIC OVERLOADING OF SINGULAIR SYSTEM

Aeration chamber settled solids test reads in excess of 75%
Aeration chamber solids appear black

Evaluate pretreatment chamber - See Singulair Tank Pumping instructions
Evaluate pretreatment chamber - See Singulair Tank Pumping instructions

FLOATING SOLIDS IN CLARIFICATION CHAMBER OR PLANT EFFLUENT

Excessive sludge on clarifier sidewalls
Restriction of Bio-Static or sludge return port
Pretreatment chamber discharging excessive solids
Hydraulic overloading of system

Scrape hopper side walls
Remove obstruction
Evaluate pretreatment chamber - See Singulair Tank Pumping instructions
See “Hydraulic Overloading”

CONTROL CENTER WARNING LIGHT GLOWS/AUDIBLE ALARM SOUNDING

Liquid in tank at level of foam restrictor
Aerator drawing excessive current
Dead short in power line to aerator

See “Singulair System Flooded”
See “Aerator Drawing Excessive Current”
Have owner call his electrician

PROGRESS THROUGH SERVICE SINCE 1906
AERATOR TROUBLESHOOTING

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 Service Pro 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 TROUBLESHOOTING (Cont.)
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 testing with the electrical multi-meter. Repairs 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

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

NO ELECTRICAL POWER FROM CONTROL CENTER TO AERATOR

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Pro control center terminal A1 and neutral read zero voltage</td>
<td>Place selector switch in “on” 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.</td>
</tr>
<tr>
<td>Singulair circuit breaker has tripped</td>
<td>Push reset breaker</td>
</tr>
<tr>
<td>Singulair circuit breaker is defective</td>
<td>Replace breaker</td>
</tr>
<tr>
<td>Singulair selector switch turned “off”</td>
<td>Turn switch to “automatic” operation</td>
</tr>
<tr>
<td>Singulair selector switch defective</td>
<td>Replace control center insert</td>
</tr>
<tr>
<td>Corrosion on terminals prevents flow of current</td>
<td>Clean or replace contacts</td>
</tr>
<tr>
<td>Power cable from Service Pro control center to aerator damaged</td>
<td>Locate damage and repair</td>
</tr>
<tr>
<td>Loose wiring connection</td>
<td>Check all connections</td>
</tr>
</tbody>
</table>

AERATOR WILL NOT START

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reset breaker in Service Pro control center tripped</td>
<td>Push reset breaker</td>
</tr>
<tr>
<td>Loss of power to Service Pro control center</td>
<td>See both “No Electrical Power” sections</td>
</tr>
<tr>
<td>Insufficient voltage present at aerator</td>
<td>Report condition to power company</td>
</tr>
<tr>
<td>Watertight electrical connector not properly engaged</td>
<td>Remove watertight electrical connector and plug in tightly</td>
</tr>
<tr>
<td>Watertight electrical connector not properly wired</td>
<td>Rewire watertight electrical connector</td>
</tr>
<tr>
<td>Defective motor</td>
<td>Return entire aerator to factory</td>
</tr>
</tbody>
</table>
Although the system effluent may be discharged and/or disposed of in several acceptable fashions, there should be a ground water relief point installed in the effluent line. It should be 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 from obstructions.

**SINGULAR AIR 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 TROUBLESHOOTING (Cont.)

#### BIO-KINETIC SYSTEM PLUGGED (Cont.)

<table>
<thead>
<tr>
<th>Problem Description</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compartmented contact chamber plates plugged</td>
<td>Clean chamber plates</td>
</tr>
<tr>
<td>Outlet weir obstructed</td>
<td>Inspect and clean outlet weir</td>
</tr>
</tbody>
</table>

**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.

### NO RESIDUAL CHLORINE IN FINAL EFFLUENT

<table>
<thead>
<tr>
<th>Problem Description</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine feed tube not dispensing chlorine - empty</td>
<td>Refill feed tube with Blue Crystal disinfecting tablets</td>
</tr>
<tr>
<td>Chlorine feed tube not dispensing chlorine - tablets jammed</td>
<td>Gently tap tablets down in feed tube to be sure they make contact with the inside bottom of tube</td>
</tr>
<tr>
<td>Chlorine feed tube not dispensing chlorine - not fully engaged</td>
<td>Check feed tube to be sure bottom of tube is flush in flow deck</td>
</tr>
<tr>
<td>Chlorine feed tube not dispensing chlorine - feed tube plugged</td>
<td>Remove obstruction and reinstall feed tube</td>
</tr>
</tbody>
</table>

**CAUTION:** Extreme care must be used when handling chemicals. Refer to the Blue Crystal handling instructions before attempting any service. Proper procedures and personal protective equipment must be utilized to avoid serious injury.

### FINAL EFFLUENT APPEARS CLOUDY OR TURBID

<table>
<thead>
<tr>
<th>Problem Description</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerator not operating</td>
<td>See Aerator Trouble-Shooting</td>
</tr>
<tr>
<td>Hydraulic overloading</td>
<td>See “Hydraulic Overloading”</td>
</tr>
<tr>
<td>Organic overloading</td>
<td>See “Organic Overloading”</td>
</tr>
<tr>
<td>Chlorinator not working</td>
<td>See “No Residual Chlorine in Final Effluent”</td>
</tr>
<tr>
<td>Bio-Kinetic system is damaged</td>
<td>Replace system. See Clarification Chamber and Bio-Kinetic Service instructions</td>
</tr>
<tr>
<td>Bio-Kinetic system is plugged</td>
<td>See Routine Clarification Chamber and Bio-Kinetic Service Instructions</td>
</tr>
<tr>
<td>Saturated disposal field</td>
<td>Report to owner immediately</td>
</tr>
</tbody>
</table>

### DECHLORINATION INSTALLED WITH RESIDUAL CHLORINE STILL PRESENT IN FINAL EFFLUENT

<table>
<thead>
<tr>
<th>Problem Description</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dechlorination feed tube not dispensing chemical - empty</td>
<td>Refill feed tube with Bio-Neutralizer dechlorination tablets</td>
</tr>
<tr>
<td>Dechlorination feed tube not dispensing chemical - tablets jammed</td>
<td>Gently tap tablets down in feed tube to be sure they make contact with the inside bottom of tube</td>
</tr>
<tr>
<td>Dechlorination feed tube not dispensing chemical - not fully engaged</td>
<td>Check feed tube to be sure bottom of tube is flush in flow deck</td>
</tr>
<tr>
<td>Dechlorination feed tube not dispensing chemical - feed tube plugged</td>
<td>Remove obstruction and reinstall feed tube</td>
</tr>
</tbody>
</table>

**CAUTION:** Extreme care must be used when handling any chemicals. Refer to the Bio-Neutralizer handling instructions before attempting any service. Proper procedures and personal protective equipment must be utilized to avoid serious injury.
1. A dedicated 15 amp circuit breaker at main service panel should not be exceeded until the activation is completed.

2. The control panel must be reprogrammed when the facility is occupied.

3. The local notification must be placed into service.

4. Block instructions not shown for clarity.
120 VOLT - 1Ø - 60 Hz - 20 AMP SERVICE

NOTE: AERATOR, PUMP AND INTEGRATED SYSTEM CONTROL PANEL MUST BE PROPERLY GROUNDED.

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. ENSURE THE AERATOR IS OPERATING WHEN THE FACILITY IS OCCUPIED.

3. THE LOCAL, LICENSED NORWECO DISTRIBUTOR WILL PLACE THE AERATOR INTO SERVICE.
GENERAL NOTES:
1. UNDERGROUND POWER SUPPLY MUST BE WIRED INTO AN APPROVED SINGULAR® CONTROL CENTER.
2. SINGULAR® 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.
GENERAL NOTES:

1. AFTER INSTALLATION, ALL CHAMBERS OF THE SINGULAR 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.

3. WHEN USING OPTIONAL CHEMICAL FEED TUBES, INSURE THE BLUE CRYSTAL® CHLORINATION FEED TUBE IS INSTALLED THROUGH THE MOUNTING COLLAR NEAREST THE AERATOR MOUNTING CASTING, AND THE BIO-NEUTRALIZER® DECHLORINATION FEED TUBE IS INSTALLED THROUGH THE MOUNTING COLLAR NEAREST THE SYSTEM OUTLET.
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.
GENERAL NOTES:

1. SINGULAR® AERATOR, AS TESTED AND ACCEPTED BY NSF, OPERATING 60 MINUTES ON / 60 MINUTES OFF.

2. FALL THROUGH SINGULAR® PLANT FROM INLET INVERT TO OUTLET INVERT IS FOUR INCHES, INLET INVERT IS TWELVE INCHES BELOW TANK TOP.

3. ON DEEPER INSTALLATIONS, PRECAST RISERS MUST BE USED TO EXTEND AERATOR MOUNTING CASTING AND BIO-KINETIC® SYSTEM MOUNTING CASTING TO GRADE, INSPECTION COVER ON PRETREATMENT CHAMBER MUST BE DEVELOPED TO WITHIN TWELVE INCHES OF GRADE.

4. TANK REINFORCED PER ACI STD. 318.

5. REMOVABLE COVERS ON RISERS WEIGH IN EXCESS OF SEVENTY-FIVE POUNDS EACH TO PREVENT UNAUTHORIZED ACCESS.

6. CONTACT THE LOCAL, LICENSED SINGULAR® DISTRIBUTOR FOR ELECTRICAL REQUIREMENTS.

PROJECT ENGINEER'S APPROVAL:

I (We) hereby certify that this drawing has been checked and is approved for use in conformity with the contract documents.

DATE: ________________________

NAME: ________________________

CONTRACTOR'S CERTIFICATION:

I (We) hereby certify that this drawing has been checked and is approved for use in conformity with the contract documents.

DATE: ________________________

NAME: ________________________

CRITICAL DIMENSIONS:

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NOTE: TOTAL SYSTEM CAPACITY: 1,300 GALLONS

RATED CAPACITY: 500 GALLONS PER DAY
GENERAL NOTES:

1. SINGULAR® AERATOR, AS TESTED AND ACCEPTED BY NSF, OPERATING 60 MINUTES ON / 60 MINUTES OFF.

2. FILL THROUGH SINGULAR® PLANT FROM INLET INVERT TO OUTLET INVERT IS FOUR INCHES, INLET INVERT IS TWELVE INCHES BELOW TANK TOP.

3. ON DEEPER INSTALLATIONS, PRECAST RISERS MUST BE USED TO EXTEND AERATOR MOUNTING CASTING AND BIO-KINETIC® SYSTEM MOUNTING CASTING TO GRADE. INSPECTION COVER ON PRETREATMENT CHAMBER MUST BE DEVELOPED TO WITHIN TWELVE INCHES OF GRADE.

4. TANK REINFORCED PER ACI STD, 318.

5. REMOVABLE COVERS ON RISERS WEIGH IN EXCESS OF SEVENTY-FIVE POUNDS EACH TO PREVENT UNAUTHORIZED ACCESS.

6. CONTACT THE LOCAL, LICENSED SINGULAR® DISTRIBUTOR FOR ELECTRICAL REQUIREMENTS.

PROJECT ENGINEER'S APPROVAL:
I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

DATE: ____________________________
NAME: ____________________________

CONTRACTOR'S CERTIFICATION:
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DATE: ____________________________
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| 0' 0" | 5' 6" |

NOTE: TOTAL SYSTEM CAPACITY: 1,600 GALLONS RATED CAPACITY: 750 GALLONS PER DAY
GENERAL NOTES:

1. SINGULAR® AERATOR, AS TESTED AND ACCEPTED BY NSF.

2. FALL THROUGH SINGULAR® PLANT FROM INLET INVERT TO OUTLET INVERT IS FOUR INCHES. INLET INVERT IS TWELVE INCHES BELOW TANK TOP.

3. ON DEEPER INSTALLATIONS, PRECAST RISERS MUST BE USED TO EXTEND AERATOR MOUNTING CASTING AND BIO-KINETIC® SYSTEM MOUNTING CASTING TO GRADE. INSPECTION COVER ON PRETREATMENT CHAMBER MUST BE DEVELOPED TO WITHIN TWELVE INCHES OF GRADE.

4. TANK REINFORCED PER ACI STD. 318-05.

5. REMOVABLE COVERS ON RISERS ORR IN EXCESS OF SEVENTY-FIVE POUNDS EACH TO PREVENT UNAUTHORIZED ACCESS.

6. CONTACT THE LOCAL LICENSED SINGULAR® DISTRIBUTOR FOR ELECTRICAL REQUIREMENTS.

PROJECT ENGINEER'S APPROVAL:
I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

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NAME: ______________

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