

# ***norweco***® **SINGULAIR**® **BIO-KINETIC**®

## WASTEWATER TREATMENT SYSTEM

# TANK PUMPING INSTRUCTIONS

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

## **INTRODUCTION**

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

## **WHEN TO PUMP**

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

## **ROUTINE SERVICE INSPECTIONS**

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

## AERATION CHAMBER INSPECTION

A summary of the aeration chamber inspection procedure is listed below. For complete details on aeration chamber service, refer to the Singulair Service Manual.

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

1. Remove the vented concrete aeration chamber access cover and set aside.
2. Unplug the aerator and secure the closure cap in position to protect the electrical connector.
3. Lift the aerator straight up out of the access opening and lay it flat on the vented cover. DO NOT bump the aspirator shaft or rest the aerator on the aspirator shaft.
4. Perform a settleable solids test using a graduated cone or other clear container. For this test, make sure the aerator has been running for at least 10 minutes. Collect an aeration chamber sample immediately after turning off and removing the aerator. Refer to the "Settleable Solids Test" section of these instructions for additional details.
5. Loosen the two set screws on the bottom of the intermediate shaft and remove the aspirator shaft.
6. Clean any debris from the aspirator shaft and flush the inside of the shaft with a hose.
7. Visually check the aeration chamber surface for the presence of grease or oil. An accumulation of these materials indicates the pretreatment chamber should be evaluated.
8. Check the aeration chamber contents for the presence of non-biodegradable materials, paper, mop fibers, hair, grease or oil. A significant accumulation of these materials in the aeration chamber indicates the pretreatment chamber should be evaluated.

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

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

## SETTLEABLE SOLIDS TEST

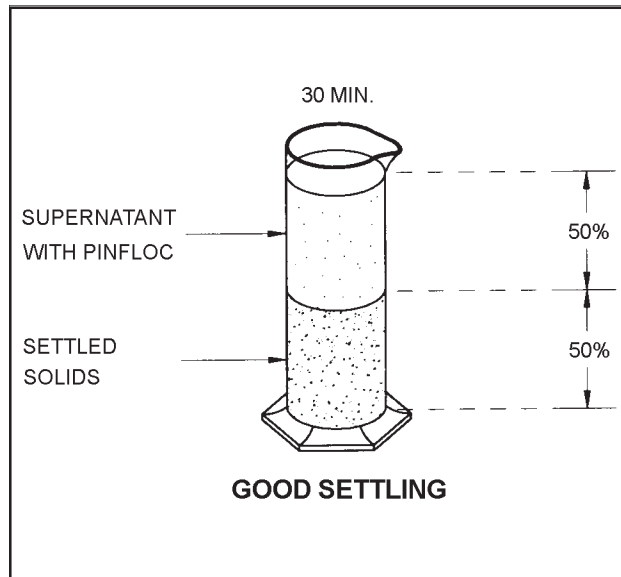
A settleable solids test should be conducted as part of the aeration chamber evaluation during each routine service inspection to monitor system performance.

To insure a well mixed sample is collected for the settleable solids test, make sure the aerator has been running for at least 10 minutes. Collect the sample immediately after turning off and removing the aerator and before the aeration chamber contents begin to settle. Using a graduated cone or other clear container, dip the container into the aeration chamber to a depth of 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.
12. Complete the clarification chamber service as outlined in the "Clarification Chamber" section of the Singulair Bio-Kinetic System Service Manual.
13. Make appropriate notations on the Singulair Service Inspection Card and on the Owner's Manual.

## EFFLUENT LINE INSPECTION

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

## PRETREATMENT CHAMBER EVALUATION

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

## PRETREATMENT CHAMBER INSPECTION

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

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

Lower the tool behind the discharge tee (baffle) to avoid floating particles. Push the tool through the settled sludge layer to the bottom of the tank. Wait several minutes and carefully remove the tool. The depth of the settled sludge layer will be shown by a dark line on the towel. If the settled sludge layer has accumulated to the bottom of the discharge tee, the chamber should be pumped.

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

## WHAT TO PUMP

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

SYSTEM CAPACITY		
Singulair Model	Pretreatment Chamber	Total System
500 GPD	450 Gallons	1300 Gallons
750 GPD	550 Gallons	1600 Gallons
1000 GPD	1000 Gallons	2300 Gallons
1250 GPD	1250 Gallons	2850 Gallons
1500 GPD	1500 Gallons	3400 Gallons

## HOW TO PUMP THE SINGULAIR SYSTEM

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

1. If any portion of the Singulair system requires pumping, contact a tank pumping service licensed by the local regulatory agency. The septage or biosolids from the system must be removed and disposed of in a manner consistent with federal, state and local regulations.

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

**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.

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.*



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and wastewater treatment

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