

norweco[®]

BIO-KINETIC[®]

WASTEWATER MANAGEMENT SYSTEM — MODEL BK 2000

INSTALLATION AND OPERATION MANUAL

INTRODUCTION

The Bio-Kinetic wastewater management system transforms new and existing conventional treatment methods into advanced treatment processes. Designed to accommodate flows up to 2,000 gallons per day (GPD), the BK 2000 combines filtration, settling, flow equalization and chemical treatment into a single, compact, easily installed and serviceable system. These features provide treatment within the BK 2000 and make septic tanks and other treatment systems work better by managing hydraulic surges and increasing detention time in all processes. The BK 2000 is completely non-mechanical, requires no electricity and operates continuously with minimal maintenance. To maximize operational life and insure proper performance, please take the time to familiarize yourself with the contents of this manual.

SYSTEM APPLICATION

Most onsite treatment systems have limited accessibility, which inhibits maintenance and shortens the life expectancy of the device. The BK 2000 can be used with any onsite system, including septic tanks, aerobic systems, grease traps, tile fields, sand filters, media filters, mound systems, drip systems, irrigation systems, constructed wetlands, or any treatment process that may be biologically or hydraulically sensitive or difficult to replace. Install the BK 2000 immediately downstream (behind) of the treatment tank and upstream (in front) of the final disposal system. Installation of the BK 2000 between the treatment component and the disposal component multiplies the effectiveness of the treatment process and permanently extends the life of the effluent disposal system.

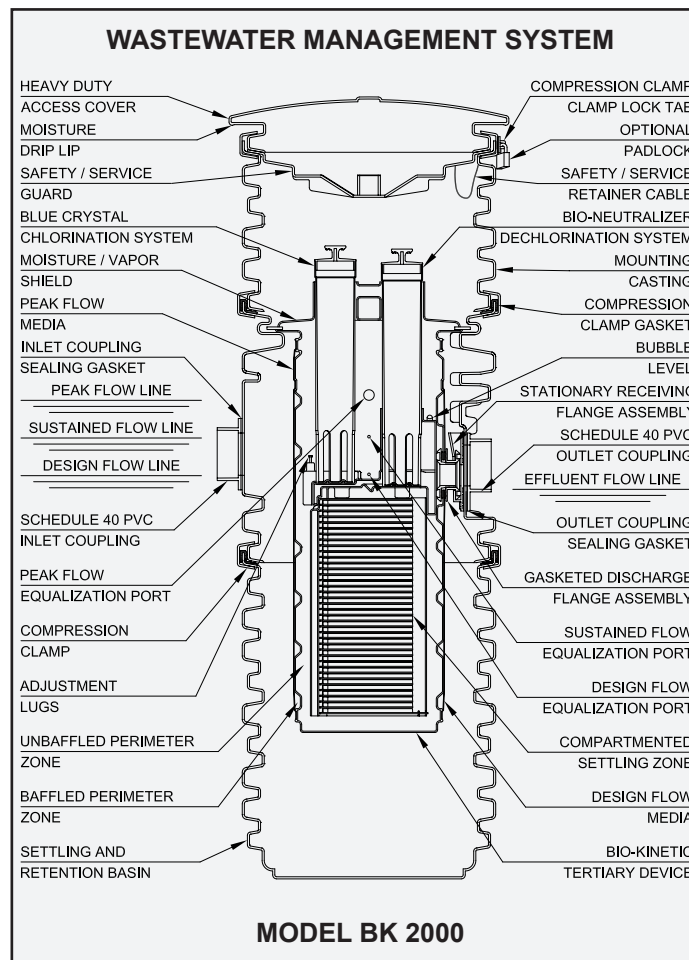
HOW THE SYSTEM WORKS

Incoming flow from the treatment plant enters the one-piece settling basin. As the flow is held in this first settling zone, suspended solids and other impurities are retained within the basin while flow equalization manages the liquid level throughout the system. Next, equalized flow passes through the Bio-Kinetic tertiary treatment device, where three filtration zones and eight additional settling zones provide treatment at each step along the way. Chemicals can be automatically applied, if required, by the Blue Crystal disinfection feed system and/or the Bio-Neutralizer dechlorination feed system. Highly treated effluent then continues out of the BK 2000 and into the disposal device. These extensive physical, biological and chemical treatment processes produce a high quality effluent that can be safely returned to the environment.

SYSTEM PERFORMANCE

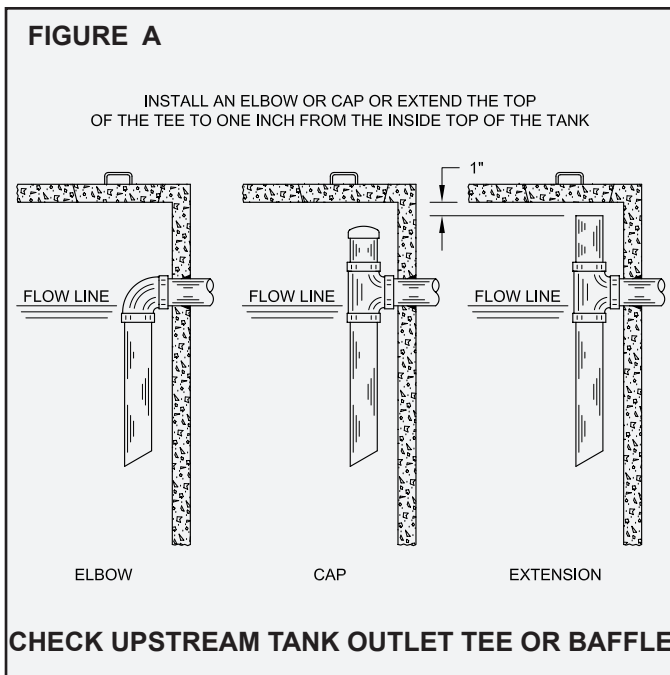
The BK 2000 equalizes daily flow an average of more than 50%. This loading reduction greatly improves primary and secondary treatment plants and doubles the life of most effluent disposal systems. The Bio-Kinetic device is listed as a certified chlorine dispenser under NSF/ANSI Standard 46. The BK 2000 is rated for flows up to 2,000 GPD, however, Standard 46 applies only to secondary effluent from residential wastewater treatment systems up to 1,500 GPD.

While the BK 2000 serves as its own contact tank, certification requires the use of Blue Crystal or Bio-Sanitizer disinfecting tablets. Retention time must comply with the controlling regulatory jurisdiction. 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."



GENERAL INSTALLATION INSTRUCTIONS

The BK 2000 is 72" tall, weighs approximately 100 pounds and can be installed by one person in three hours or less. Keep the BK 2000 in a vertical position at all times during storage and delivery. Each BK 2000 is individually stretch wrapped. Do not remove this wrapping until installation is to begin. Molded inlet and outlet hubs permit a direct solvent weld connection to 4" Schedule 40 PVC piping. The hubs are bolted and sealed to the settling basin to prevent shear of the connections during installation or ground settling. The upstream treatment tank outlet must be checked to insure that the tee or baffle will prevent floating solids from exiting the tank during flow equalization. The outlet tee or baffle must extend to within 1" of the inside top of the tank. If the outlet of the upstream treatment tank does not meet this requirement, it should be modified. The tee or baffle can be extended, capped, or an elbow installed in place of the tee (See Figure A). All installations should have a 4" leveling pad of sand, gravel or fine crushed stone and be backfilled with this material up to the inlet and outlet sewer lines.



NEW SYSTEM INSTALLATION

Install the BK 2000 within 10 feet of the treatment tank to take full advantage of the upstream tank capacity for flow equalization (See Figure C). The connecting pipe should have less than 1/4" of fall. If the effluent disposal system includes timed or pressure dosed distribution, the BK 2000 should be installed upstream of the dosing chamber.

EXISTING SYSTEM RETROFIT

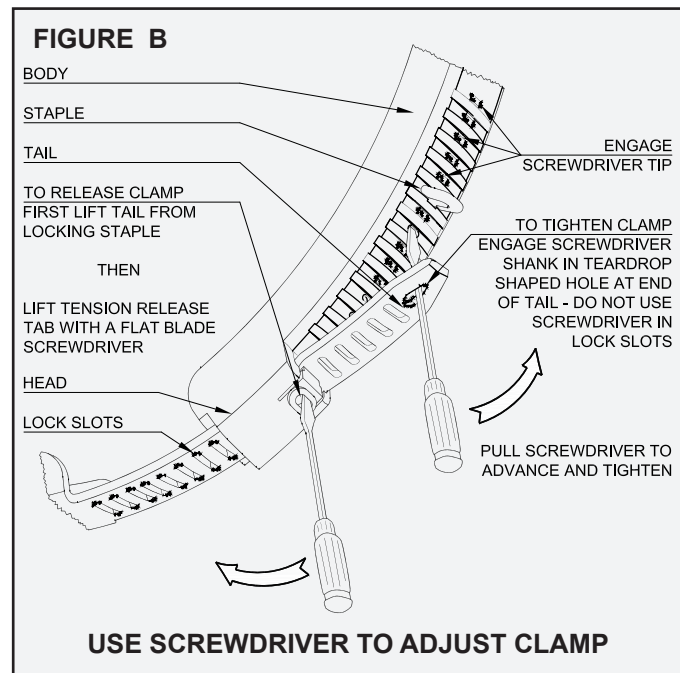
The BK 2000 can be easily installed to upgrade existing treatment and disposal systems (See Figure C). The only requirement is an area large enough to install the BK 2000 and connecting piping. Make sure that the outlet tee or baffle is configured to accommodate flow equalization.

SEGMENTED BASINS, RISERS AND RINGS

In addition to being available in one-piece, the basin can also be segmented for UPS ground or air shipment. Risers are available for use where connecting piping is more than three feet below finished grade. The holding capacity of the basin can also be increased by adding ring sections below the outlet invert. One-piece risers and rings are available in one foot to six foot sections and may be trimmed in the field to fit individual installation requirements (See Figure L). Segmented basins, risers and rings are connected by compression clamps and sealing gaskets.

COMPRESSION CLAMPS AND GASKETS

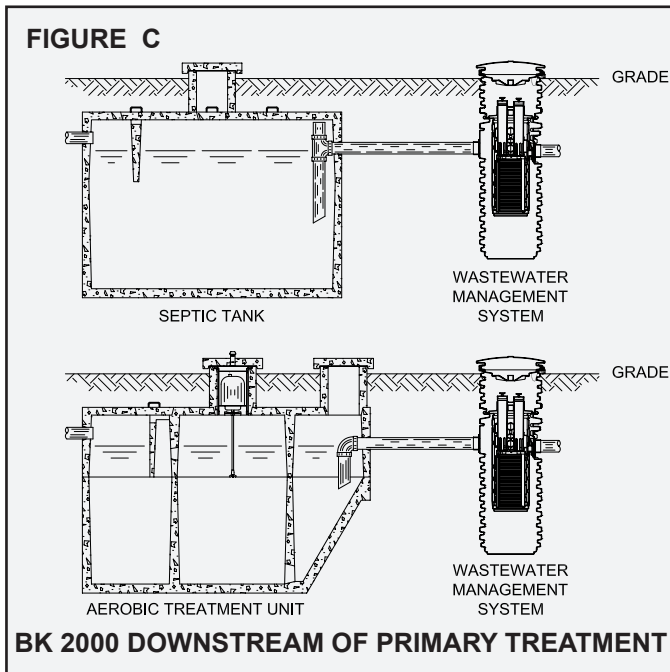
A compression clamp is used to safely secure the access cover to the settling basin of the BK 2000 (See Figure B).



Segmented basins, risers and rings are secured by the clamp and a sealing gasket, which is used to provide watertight integrity (See Figure J). The sealing gasket is installed on the female section of the joint and the clamp secures the connection. To install the compression clamp, place the clamp over the joint to be connected. Insert the tail of the clamp into the head and pull the tail until the clamp is tight. Insert a flat blade screwdriver through the teardrop-shaped hole in the tail and engage the blade into a slot on the body of the clamp. Tighten by using the screwdriver as a lever. The latch mechanism will automatically engage the slots in the tail of the clamp. Tighten as much as possible and then engage the tail section over the locking staple. Secure the clamp through the locking staple with the stainless steel fastener or optional master-keyed padlock. To remove the compression clamp, remove the fastener or padlock and lift the tail section off the locking staple. Insert a flat blade screwdriver into the tension release tab in the head of the clamp. Pry the tab back to disengage the latch mechanism from the tail and pull the tail of the clamp out of the head.

CHECKING THE EXCAVATION

The excavation should be a minimum of 36" wide by 36" long, or 36" diameter if an auger is used for excavation. Additional overdig will be required on deeper installations or where unstable soil conditions exist. To determine the exact excavation depth, add the height of the basin, including optional risers and rings to the leveling pad thickness (at least 4") and deduct 3", so that the basin will extend 3" above finished grade. The depth of influent and effluent sewer line trenches should correspond with the BK 2000 inlet and outlet connections. The trenches should be smooth and free of debris to prevent damage to the sewer lines. The outlet invert of the basin is located 1" lower than the inlet invert. Extreme care must be taken any time personnel or equipment are in the vicinity of an open excavation. Installation procedures, equipment, tools, materials and personnel should always comply with safety regulations and federal, state and local codes.

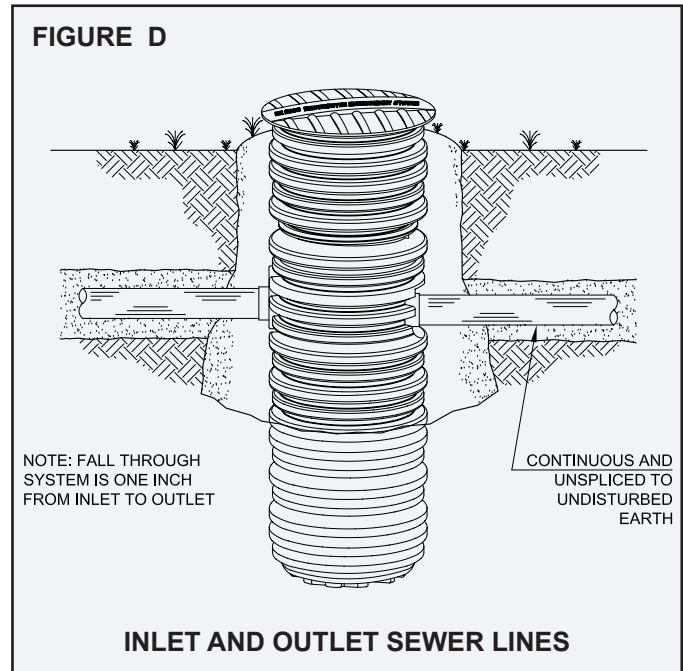


SETTING AND LEVELING THE BASIN

Remove the Bio-Kinetic device from the basin and dispose of the cardboard packaging. Check the filter media on the outside of the Bio-Kinetic device to see that it has not been damaged during shipment or storage. If the media has been damaged, replacement kits are available from the local BK 2000 distributor. To replace the filter media, follow the instructions contained in the replacement kit. Make sure all packaging material is completely removed from all components. Basins with multiple sections must be assembled prior to installation. See the instructions provided with the segmented basin or riser package for assembly. Lower the settling basin into the leveled excavation. Insure the inlet and outlet hubs are properly aligned with the influent and effluent sewer lines. Use a four foot level to confirm that the basin is plumb and level. Adjust the position of the settling basin by adding or removing leveling pad material.

INSTALLING THE SEWER LINES

Influent and effluent sewer lines must be at least four inch diameter. If the treatment system piping is larger than 4", adapter couplings may be used. In order to maximize flow equalization, the BK 2000 inlet pipe should be no longer than 10 feet and should fall no more than 1/4" over its entire length (See Figure C). The effluent trench must allow the outlet sewer line a minimum 1/8" fall per lineal foot of run along the entire length. Before installing the sewer lines, place approximately 12" of fill around the bottom of the basin to hold it in place. Solvent weld the sewer lines to the anti-shear inlet and outlet hubs with PVC primer and cement.



Inlet and outlet lines should be laid continuously and unspliced to undisturbed earth beyond the limits of the excavation (See Figure D). Schedule 40 PVC, cast iron or similar materials may be used for sewer lines, subject to the approval of local codes. Check the sewer lines to insure they are constructed with compatible fittings and joining materials throughout. Recheck the system level.

BACKFILLING THE EXCAVATION

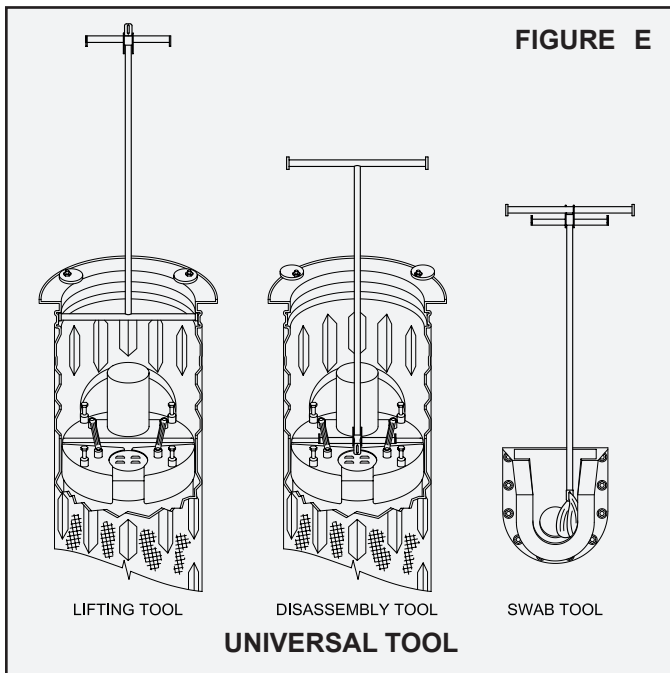
The excavation should be backfilled immediately after the sewer lines are installed. As the installation is backfilled, fill the settling basin with hold down water. Sand, gravel or other granular material should be used to backfill the excavation up to the sewer line trenches. In heavy clay soils, the basin should be backfilled with granular material to within 6" of grade. Backfill evenly around the perimeter of the basin, insuring that no voids exist between the ribs. Finished grade should be three inches below the upper rim of the basin and should slope away. BK 2000 riser sections may be added as necessary to reach finished grade. Exercise care while backfilling. Do not allow dirt or mud to enter any part of the settling basin or sewer lines. If dirt or mud enters any portion of the system, the system must be pumped and cleaned to insure proper operation.

BASIN HOLD DOWN WATER

Hold down water must be added to the basin as it is backfilled to prevent the basin from shifting. The basin must be filled with water to facilitate the installation of the Bio-Kinetic tertiary treatment device. Hold down water should be clean and free of construction debris, mud, oils or other materials that might interfere with proper system operation.

USING THE UNIVERSAL TOOL

The universal tool is used during installation and maintenance of the BK 2000 and the Bio-Kinetic tertiary treatment device. It incorporates a swab tool, locking tool, lifting tool and disassembly tool into one multi-use assembly (See Figures E and G). The swab tool is stationary on one end and is used to apply lubricant to the rubber and plastic outlet connection components. The lug locking tool is stationary on the same end and is used to turn the locking lugs on the top collar of the Bio-Kinetic device. The lifting tool is stationary on the other end of the universal tool and is used to install and remove the Bio-Kinetic device from the settling basin. The disassembly tool is retractable from end to end and allows the inner components of the Bio-Kinetic device to be removed and reinstalled without removing the entire assembly from the settling and retention basin.



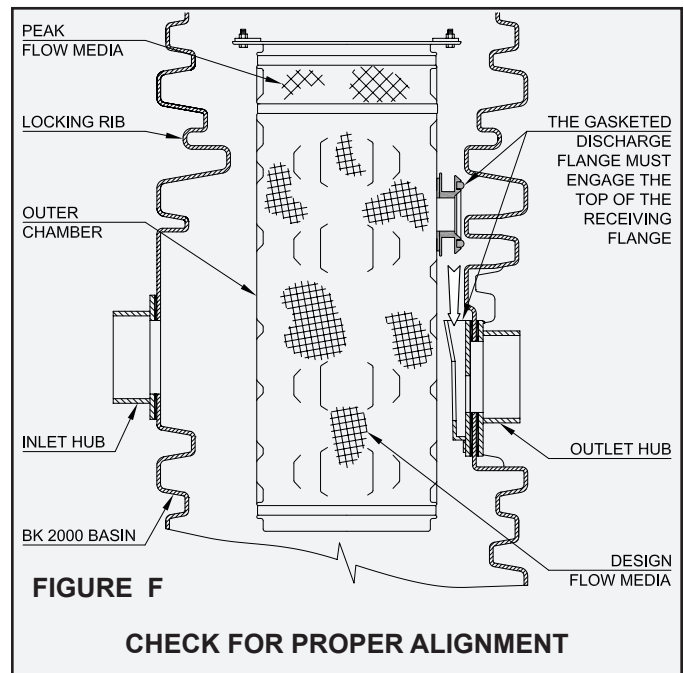
BIO-KINETIC® DEVICE INSTALLATION

The cardboard shipping sleeve protecting the internal components of the Bio-Kinetic device must be removed before installation. Turn the locking lugs clockwise to the outboard position. Insert the disassembly tool beneath the lifting handles of the flow deck and grasp the top flange of the Bio-Kinetic device. Lift to remove the internal components from the outer chamber and discard the shipping sleeve. Check to see that the through-rods firmly connect the chamber plates and the flow deck.

ASSEMBLY OF THE OUTER CHAMBER AND INTERNAL COMPONENTS

Place the internal components back into the outer chamber of the Bio-Kinetic device. Align the flow deck outlet with the outer chamber outlet. Apply a moderate amount of downward force on the flow deck until it rests firmly on the support bosses molded into the outer chamber. The flow deck and internal components must be fully engaged in the outer chamber for proper operation. The discharge flange of the Bio-Kinetic device will engage the receiving flange inside the settling basin. Examine the receiving flange bolted to the inside of the settling basin. Any debris that may have accumulated in the receiving flange or on the discharge flange must be removed. For ease of installation, the receiving flange and discharge flange gasket have been lubricated at the factory with Bio-Kinetic lubricant. Additional lubricant is not needed until the unit is serviced.

WARNING: Bio-Kinetic lubricant is specially formulated. Use of other lubricants, particularly petroleum-based lubricants, can be dangerous with chlorine, can degrade the rubber and plastic components and will void the warranty.



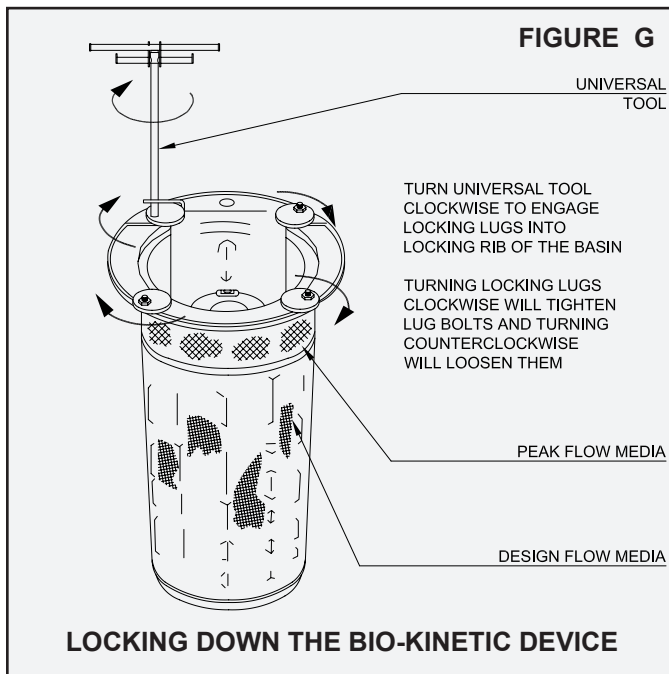
Turn the locking lugs clockwise to the inboard position. Use the lifting tool to lower the reassembled Bio-Kinetic device into the settling basin. Align the discharge flange of the Bio-Kinetic device with the receiving flange at the outlet of the settling basin (See Figure F). Buoyancy will cause the Bio-Kinetic device to float near the top of the basin. Water must be added to equalize internal and external pressure as the Bio-Kinetic device is lowered into the basin. Use a hose connected to a clean water supply to fill the Bio-Kinetic device through the rectangular opening in the flow deck. As the device fills, it will gradually sink into the settling basin. Use the lifting tool to guide the Bio-Kinetic device through the center of the basin. Maintain the Bio-Kinetic device in a vertical position until it sinks into the settling basin.

FINAL INSTALLATION OF THE BIO-KINETIC® DEVICE WITHIN THE SETTLING BASIN

Use the viewing port in the top collar of the Bio-Kinetic device (See Figure K) to be sure proper alignment and engagement of the outlet connection takes place. The gasketed discharge flange must properly engage the top of the receiving flange. Continue to fill the Bio-Kinetic device with water until the discharge flange completely engages the receiving flange. The top collar of the Bio-Kinetic device must rest evenly on the support rib molded into the settling basin. Confirm that the outlet coupling is fully engaged. Turn off the water supply and remove the hose.

LOCKING DOWN THE BIO-KINETIC® DEVICE

To lock the Bio-Kinetic device in place, use the lug locking tool to twist each of the locking lugs clockwise to the outboard position (See Figure G). Each lug should be positioned directly under the locking rib of the basin (See Figure F).

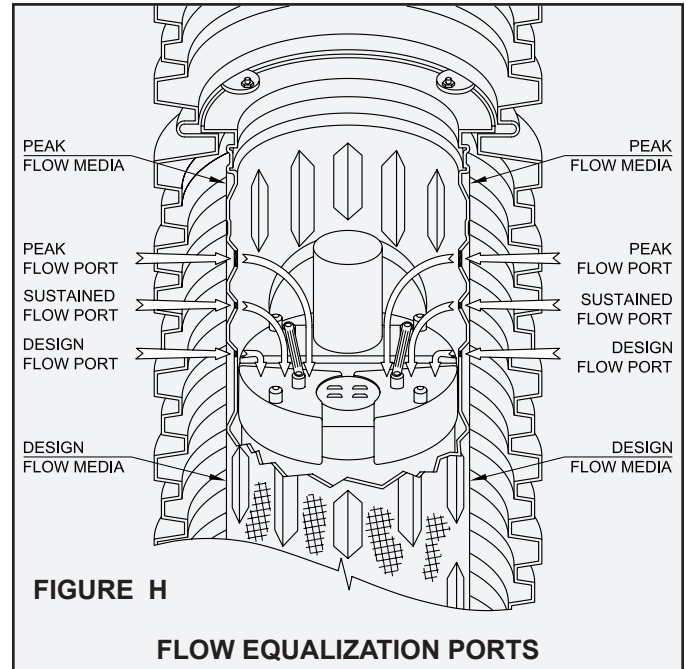


NON-MECHANICAL FLOW EQUALIZATION

The Bio-Kinetic tertiary device enhances the operation of the entire treatment and disposal system by equalizing flow and holding it upstream during peak loading and hydraulic surges. Flow into an individual treatment system is normally a number of small surges (e.g. typical shower of 10 minutes, bathtub discharge of 5 minutes, clothes washer discharge of 2 minutes, and dishwasher discharge of 2 minutes duration) that the system must process. The rate of flow equalization provided depends upon the flow pattern and the size of the upstream treatment tank. At a typical 500 GPD loading pattern with an upstream tank of 50 ft² surface area, the BK 2000 equalizes flow an average of 50%. When used in conjunction with an upstream treatment tank of 80 ft² surface area, the BK 2000 will equalize a typical flow of 2,000 GPD an average of 60%.

DESIGN FLOW PORTS

All six flow ports of the Bio-Kinetic device operate automatically, require no electricity and have no moving parts (See Figure H). The only maintenance required for the flow ports is to check for obstructions during installation and maintenance. Two design flow ports are located at the normal liquid level of the treatment process. The design flow ports manage standard flow variations and control flow through all upstream and downstream processes. The design flow ports are almost always in use, controlling the flow entering the Bio-Kinetic device and causing hydraulic surges to be stored upstream.



SUSTAINED FLOW PORTS

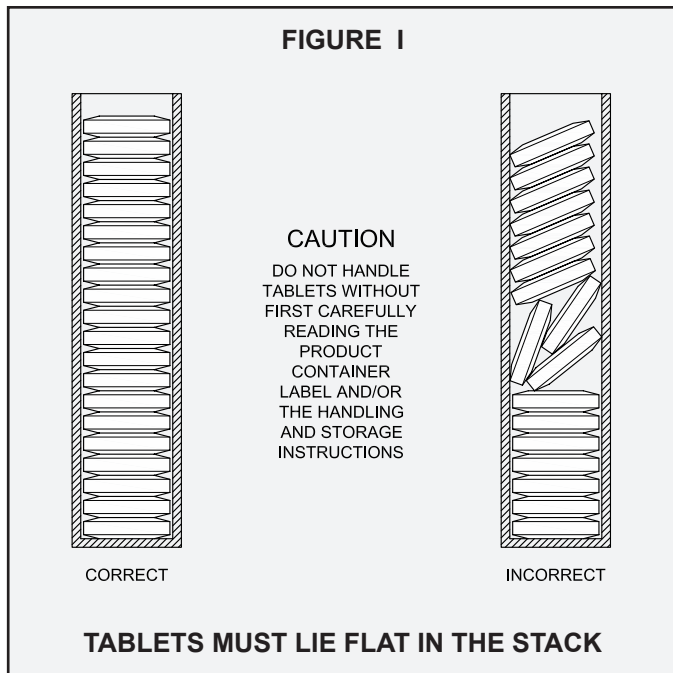
Two sustained flow ports are located above the design flow ports. These sustained flow ports manage longer hydraulic surges that have caused a sufficient amount of hydraulic head rise in the settling basin and treatment tank. When liquid rises to the sustained flow ports, the flow going through the Bio-Kinetic device increases while flow equalization is maintained. Larger flow surges are managed without compromising effluent quality (See Figure H).

PEAK FLOW PORTS

Two peak flow ports are located safely in reserve, well above the design and sustained flow ports. The peak flow ports allow prolonged surges to be managed by the Bio-Kinetic device. As flow rises above the design flow ports, past the sustained flow ports and to the peak flow ports, constant treatment is taking place. Settling and filtration continues to be performed and solids washout is prevented. As liquid reaches the peak flow ports, the effluent flow rate is allowed to increase while still protecting the disposal device. All the while, the hydraulic surge has been managed and effluent quality protected (See Figure H).

FILLING AND INSTALLING FEED TUBES

If the Blue Crystal chlorination system (blue tube) and/or the Bio-Neutralizer dechlorination system (green tube) is required, the appropriate feed tube must be filled and installed within the Bio-Kinetic device. Before handling chemical tablets, carefully read the product container label and the **CAUTION** section of these instructions. To fill a feed tube, remove the cap and hold the tube open end down. Insert the chemical tablets, one tablet at a time, until the tube is filled. Each tablet must lie flat in the stack (See Figure I). When the tube is completely filled, turn it over and replace the cap. Install the feed tube, slotted end down, through the appropriate mounting collar in the moisture shield. The bottom of the feed tube must come to rest evenly on the floor of the flow deck and properly engage the locating ribs.



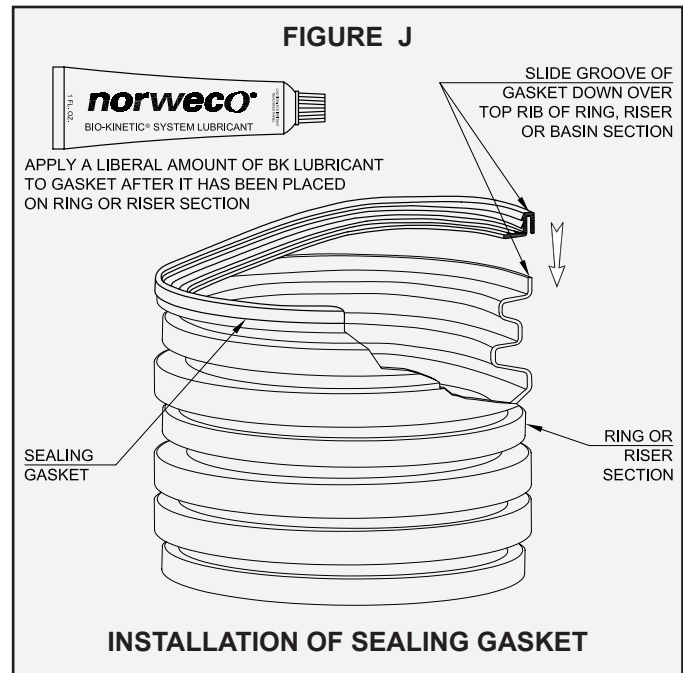
NOTE: The chlorine feed tube must always be installed through the moisture shield mounting collar nearest the basin inlet. If the installation requires disinfection and dechlorination, there will be two openings in the moisture shield. The dechlorination feed tube must always be installed through the mounting collar nearest the basin outlet.

FEED TUBE EXTENSION, CLEANING BRUSH AND REMOTE REMOVAL SYSTEM

For installations that use a riser section taller than 12", remote removal systems are available to allow safe removal and reinstallation of the feed tubes from grade. There is never a need for anyone to put their face, head or torso into the BK 2000. The remote removal system consists of a top-threaded cap and removal handle. The handles may also be used with a brush, available from the local BK 2000 distributor, to clean the feed tubes during service. Feed tube extensions are also available to increase the number of chemical tablets held in the feed tubes. Extensions fit securely on the feed tubes and use the same cap.

BLUE CRYSTAL® CHLORINATION TABLETS

Blue Crystal tablets are a special microbicide developed exclusively for use in residential treatment systems. Designed for positive disinfection during low, sustained, variable and intermittent flow rates that are common to residential systems, the potent formulation of Blue Crystal tablets reduces 99% of bacteria within the first ten minutes of contact. Blue Crystal tablets automatically adjust their dissolve rate in direct proportion to the incoming flow rate to provide a consistent chlorine application.



BIO-SANITIZER® CHLORINATION TABLETS

Bio-Sanitizer tablets are designed to provide effective and reliable disinfection of flows over 1,500 GPD. Manufactured from pure calcium hypochlorite, Bio-Sanitizer tablets insure efficient and dependable chlorination where a predictable long-term source of chlorine is desired. Bio-Sanitizer tablets provide maximum disinfection without releasing unnecessary quantities of chlorine into the environment.

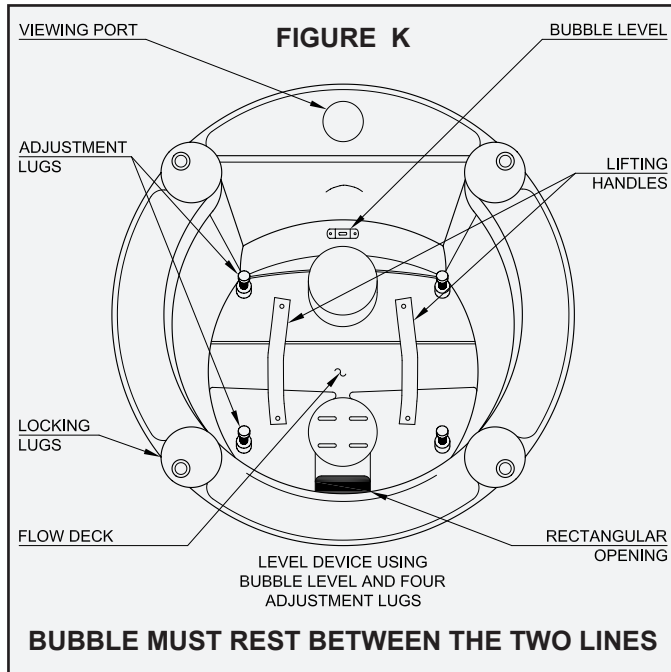
BIO-NEUTRALIZER® DECHLORINATION TABLETS

An effective means to neutralize both free and combined chlorine, Bio-Neutralizer tablets consistently reduce or eliminate chlorine residual. Bio-Neutralizer tablets provide a controlled release of sodium sulfite for the removal of residual chlorine without reducing the level of dissolved oxygen. Bio-Neutralizer tablets insure efficient reduction of chlorine residual while maintaining overall effluent quality.

CAUTION: All chemicals and chemical feed systems should be handled with care. Chemicals and feed tubes should not be mixed with each other or any other products. Do not handle tablets or feed tubes without first carefully reading the product container label, SDS information and the handling and storage instructions.

LEVELING THE BIO-KINETIC® DEVICE

Leveling the flow deck of the Bio-Kinetic device is essential for proper operation. Locate the bubble level mounted on the flow deck above the outlet (See Figure K). The bubble should be resting squarely between the two lines in the level indicator. If the location of the bubble indicates the device is not installed in a level position, the flow deck should be leveled using the four adjustment lugs provided for that purpose. With a ratchet drive, extension and $\frac{7}{16}$ " socket, turn each of the adjustment lugs the minimum amount necessary for the bubble to rest squarely between the two lines on the clear plastic case of the level indicator.



PLACING THE BK 2000 ON LINE

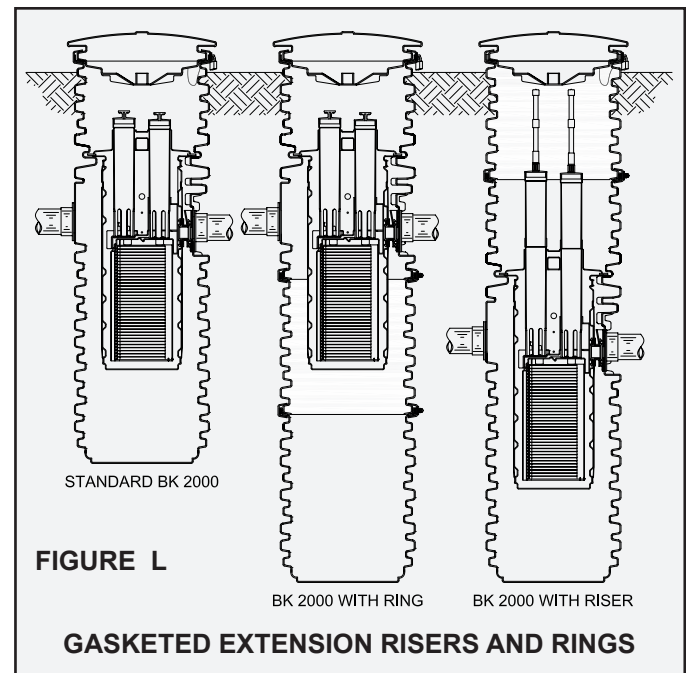
Reinstall the moisture shield on top of the Bio-Kinetic device with the handle side up. The four locator holes in the shield should completely engage the four locking lug bolts extending from the top flange of the Bio-Kinetic device. Do not add fasteners to the locking lug bolts. The moisture shield should rest evenly on the top flange of the Bio-Kinetic device. Be sure the moisture shield mounting collars that hold the Blue Crystal and Bio-Neutralizer feed tubes are in the proper position, with the handle between them aligned from inlet to outlet. If a blue chlorine feed tube is used, confirm that it is installed in the mounting collar closest to the system inlet. If a green dechlorination feed tube is used, confirm that it is installed in the mounting collar closest to the system outlet. Check to make sure any installed feed tubes are fully engaged and resting firmly and evenly on the flow deck of the Bio-Kinetic tertiary device. Reinstall the BK 2000 safety guard and access cover. Install the compression clamp to hold the access cover in place. Do not use a sealing gasket between the access cover and the settling basin. The stainless steel fastener or optional master-keyed padlock must be installed on the compression clamp to prevent unauthorized access.

ROUTINE MAINTENANCE

Routine, day to day operation of the BK 2000 requires no owner maintenance. The system does not use electricity, has no moving parts and requires no operational adjustment. With any treatment system, periodic removal of accumulated solids and grease is important to maintain proper operation. Routine service can be performed as needed by the local BK 2000 distributor, dealer or their authorized agent.

EXTENDED SERVICE PROGRAM

Owners of a BK 2000 are encouraged to discuss an extended service program with the local distributor or dealer. A regular service program is important for all onsite wastewater treatment systems. An extended service program will greatly enhance long-term system operation and prevent premature disposal system failure.



INTERMITTENT USAGE

If a period of intermittent usage or an extended period of non-use is anticipated, remove any chemical feed systems and store them in a dry, secure location. Refer to the tablet container label for detailed safety, storage and/or disposal instructions for chemical tablets. Reinstall the safety guard, access cover, compression clamp and fastener or padlock to prevent unauthorized access.

TROUBLESHOOTING

If there is a problem, contact your local distributor. The owner should not attempt repair of any part of the system. Only a factory-trained distributor or their authorized agent should perform service. The distributor's contact information is printed on the warranty card and also listed on the back of this manual. For further reference, the BK 2000 has a red identification tag with the manufacturer's contact information.

SYSTEM SAFETY

The access cover and safety guard should be in place at all times to prevent accidental or unauthorized entry into the BK 2000. As a precaution, the safety guard is permanently tethered to the basin. Only a factory-trained service technician should remove the access cover and safety guard during routine maintenance. There is never a need for the owner or service technician to enter the settling basin. Confined space entry equipment (Occupational Safety and Health Regulations OSHA 29 CFR 1910.146) is not required to service or install a BK 2000. All service and maintenance can be performed from grade. Under no circumstances should anyone put their face, head or torso into the BK 2000. Toxic fumes and methane gas present in wastewater and/or produced by treatment chemicals may accumulate within the settling basin and cause personal injury or death. After routine service is complete, the safety guard and access cover must be replaced and the stainless steel fastener or master-keyed padlock must be used to secure the compression clamp to the basin.

BK 2000 LIMITED WARRANTY

The Bio-Kinetic wastewater management system is backed by a comprehensive ten year limited warranty. The purchaser is protected from defects in material and workmanship, under normal use and service, for a period of ten years from the date of original purchase. The BK 2000 distributor or dealer will provide a warranty registration card to each purchaser. This card is used to properly register the system with the factory. The warranty is not in effect unless the warranty registration card is completed and returned to the factory within 30 days of purchase. If the BK 2000 requires repair or replacement, do not use or dismantle the system. Contact the local BK 2000 distributor to arrange service. After inspection, the distributor will return the system or component, as required, to the factory and replace the necessary items according to the terms of the limited warranty. Detailed warranty information is available from the local BK 2000 distributor.

SERVICE RECORD

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

DATE	DESCRIPTION



220 REPUBLIC STREET
 NORWALK, OHIO, U.S.A. 44857
 TELEPHONE (419) 668-4471
 FAX (419) 663-5440
 www.norweco.com

DISTRIBUTED LOCALLY BY:

Norweco®, Norweco.com®, Singulair®, Modulair®, Travalair®, Singulair R3®, Singulair Green®, Ribbit Rivet®, Hydro-Kinetic®, Hydro-Kinetic Bio-Film Reactor®, Evenair®, Lift-Rail®, Microsonic®, Bio-Dynamic®, Bio-Sanitizer®, Bio-Neutralizer®, Bio-Kinetic®, Bio-Static®, Bio-Gem®, Bio-Max®, Bio-Perc®, Blue Crystal®, Phos-4-Fade®, Enviro-C®, Nitro-Buster®, ClearCheck®, ChemCheck®, Tri-Max®, Hydra-Max®, Service Pro®, MCD®, TNT®, WASP®, Grease Buster® and “BUSTER” logo® are registered trademarks of Norwalk Wastewater Equipment Company, Inc.

©MMXX NORWECO, INC.