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SBG®

BioMaze® Suspended Biofilm Generator™

In order to get the most out of your two-year limited warranty, please register your product at <https://riovation.com/product-registration>

This limited warranty does not become effective until the end user completes and submits the warranty sheet found online.

Warranty information may be found at <https://www.riovation.com/limited-warranty> *

INSTALLATION MAINTENANCE & OPERATION MANUAL

For the RioVation® BioMaze® Model BM2624

Installed in a Single Compartment Septic Tank

INTRODUCTION

Septic tanks and drain fields are failing across the USA and the world. Even so, they are still the most widely used technology to treat and dispose of domestic wastewater from homes and small commercial establishments. In past years failure was identified by effluent surfacing at the drain field or backing up in the house or facility. However, failure to provide proper treatment before it gets to the environment is a failure, which can pollute waterways and cause real harm to Aqua life, people, and the environment

Over the years septic tanks and drain fields have been installed in locations where they should not have been, which has caused many problems with the environment, wildlife and people. In many cases these anaerobic septic tanks pollute the environment with organic material and nutrients such as nitrogen. These constituents create great problems for coastal areas and such.

There are millions of septic tanks with this problem. To address it, RioVation® developed a game-changing solution: the BioMaze® system, which converts conventional tanks into Suspended Biofilm Generators™. It easily installs into new tanks or retrofits into existing septic tanks.

HOW the BioMaze® Suspended Biofilm Generator™ (SBG®) Works

The RioVation® BioMaze® pods provide a media surface for microorganisms to colonize, forming a biofilm. The wastewater is then mixed or circulated, passing by the BioMaze® mesh media allowing the microorganisms of the biofilm to feed on or metabolize the waste products in the wastewater, producing a clear odorless effluent, high in dissolved oxygen and aerobic bacteria.

The BioMaze® mesh media is unique in how it accomplishes this. It is made up of modular, individual, self-positioning pods that are simply lowered into the septic tank through a riser in the lid, in the quantity needed to provide the proper treatment for the gallon per day flow rate.

The BioMaze® pods themselves are unique in that they are made of a proprietary plastic mesh media that is formed into a cylinder which allows wastewater to flow around and through the BioMaze® mesh media. The contents of the compartment are aerated and mixed using fine air porous ceramic diffusers and an air pump. The diffuser is attached to two of the pods called the Aeration Pods. As the wastewater is circulated around and through the BioMaze® Pods, a biofilm forms on the BioMaze mesh media to provide the biological treatment. Over time this biofilm (microorganism colonies) grows and thickens and then portions break off and settle to the bottom of the tank as sludge where it is stored until the tank is pumped. Due to the cylindrical design and the vertical positioning of the BioMaze® Pods, as sloughing or breaking off of the biofilm occurs, it is allowed to settle to the bottom of the tank which keeps the media performing at its best.

Simultaneous nitrification/denitrification occurs on and within the biofilm. Nitrification occurs on the outer portion of the biofilm where the nitrifying bacteria form due to the high dissolved oxygen levels. Once the ammonia is converted to nitrate (NO₃) by the nitrifying bacteria it can be used as an oxygen source for the heterotrophic bacteria deep inside the biofilm where anoxic conditions exist. Simply put the heterotrophic bacteria deep inside the biofilm strip the oxygen molecule off the nitrate which converts nitrate to nitrogen gas (N₂) which is a colorless, odorless, and tasteless gas that makes up about 78% of Earth's atmosphere.

Another important aspect of the BioMaze® SBG® is that through quorum sensing and dispersion, single-cell tiny colonies of microorganisms (Suspended Biofilm) are distributed throughout the compartment resulting in extreme treatment and turning the entire compartment clear, top to bottom and side to side.

ASSESSING THE SEPTIC TANK BEFORE INSTALLATION OF THE BIOMAZE® CONVERSION KIT

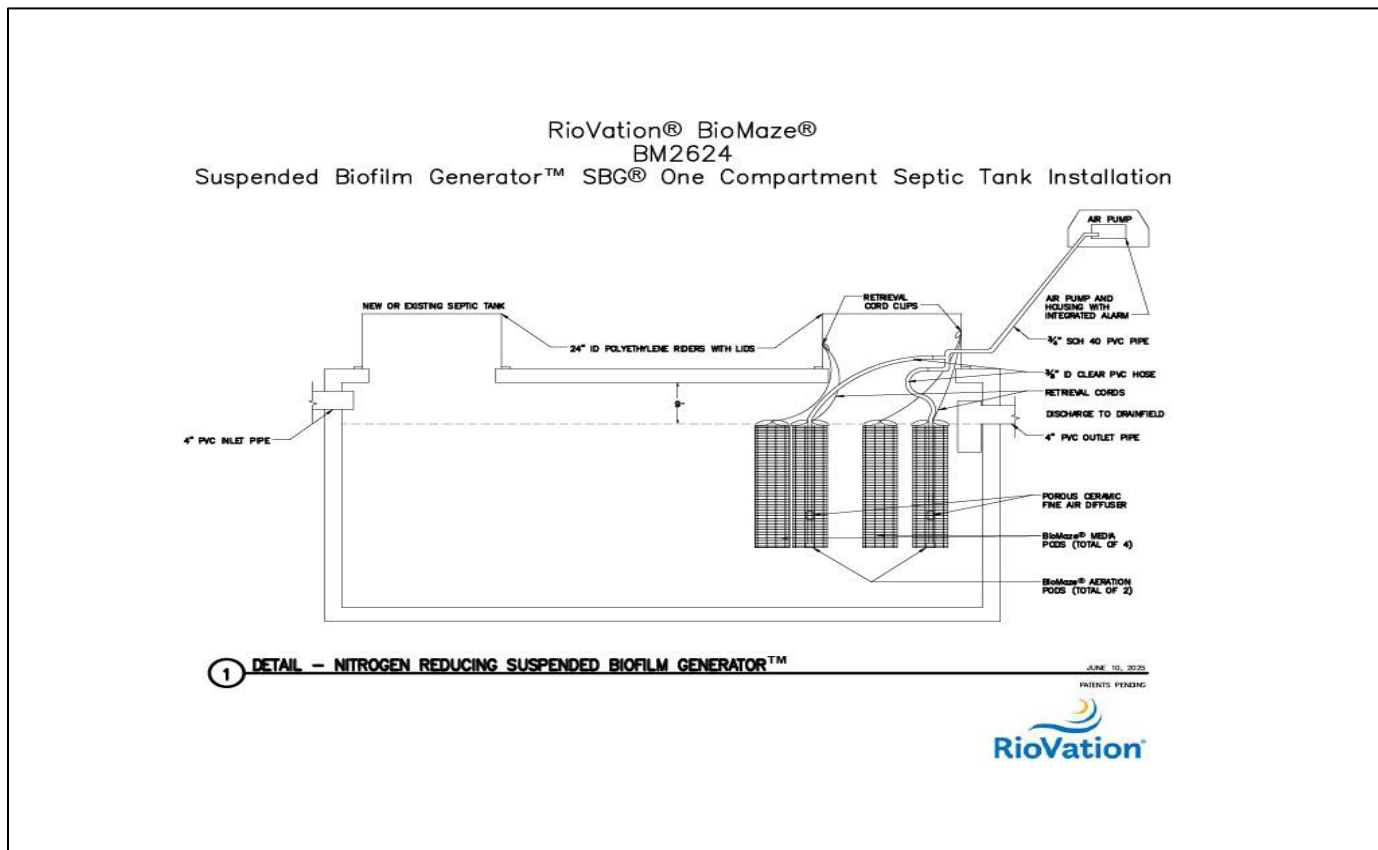
Assess the septic tank(s) before installing the BioMaze® Suspended Biofilm Generator™ (SBG®) Conversion Kit. More than likely the septic tank has been in the ground for a number of years and is covered with grass. Septic tanks can be one large tank, or a large tank separated into two compartments. It can also be two separate tanks in series. It is important to locate the entire tank(s) to accurately assess the septic tank before beginning the installation process. This can be easily done with a probe rod. Once you have located the outer edges of the tank(s), identify the inlet and outlet ends of the single compartment tank. Once the tank inspection ports have been removed, measure the depth of the tank from the flow line to the bottom of the inside of the tank. A minimum of 34" is required to install the BioMaze® pods. Two polyethylene risers with a minimum of 24" inside diameter along with lids are required to be installed on the septic tank lid over the inlet and outlet inspection ports of the tank. Follow the riser manufacturer's installation instructions and comply with state and local regulatory requirements.



Typical
BioMaze®
Pods

Aeration
Pod
&
Media Pod

Once you have located and removed all inspection ports and have pumped and cleaned the septic tank in accordance with state and local requirements and have installed the two 24" risers and lids to the grade surface you are ready to start the BioMaze® Conversion Kit installation. *NOTE! When pumping, take appropriate precautions and refill the tanks immediately. Leaving the tank(s) empty could result in the tank(s) floating to the surface.*



INSTALLATION

Instructions for the RioVation® BioMaze® Model BM2624 Single Compartment Septic Tank

1. BioMaze® Pod – Installation

The BioMaze® Pods are easy to install. The BM2624 model consists of 2 aeration and 4 non-aeration pods. With the septic tank filled to operating level, using the attached retrieval lines, lower the Pods into the septic tank through the riser access opening located on the outlet end of the septic. The Pods will position themselves and float at the proper level. The Aeration Pod(s), equipped with the porous ceramic fine air diffusers and air hose, should be installed last. Attach the provided clips evenly spaced around the inside of the riser. Seal any penetrations to the riser using a state and county approved mastic that meets ASTM C 990. Tie the ropes to the clips for future pod retrieval. The Aeration Pod(s) should be tied in such a way to keep them near the outside edge of the riser but separate from one another. The media pods are self-positioning within the tank.



← Clips and SS screws included for use with poly riser.

2. Air Pump & Housing with Integrated Alarm - Installation

A. When considering where to locate the Air Pump & Housing with Integrated Alarm, it is recommended that it be located near an existing 120-volt outlet but no further than 100' from the septic tank. If an existing electrical outlet is not available, then a weatherproof 15 or 20 amp, 120 volt outlet should be installed in the desired location in accordance with local and national electric code requirements. Once you have decided on the location for the Air Pump Housing make sure it is level. Set the Air Pump & Housing with Integrated Alarm directly on the ground and position in such a way that when hinged open it is **not obstructed**.

B. Remove the security screw and hinge open the housing. Remove all shipping straps. The only assembly required is the attachment of the beacon light to the top of the housing and plugging it into the wiring harness inside the housing. Simply place the beacon male fitting thorough the hole in the top of the housing and tighten the nut. Plug the wiring harness into the male spades provide on the beacon light (beacon and buzzer wiring are not polarity sensitive). Run the male electrical plug on the cord from the alarm assembly through the hole provided in the housing base. Once the installation is complete the male plug will be plugged into the 120 volt outlet.

3. Connecting Air Line – Installation

A. A connecting airline must be installed between the air pump housing discharge hose and the Aeration Pods air hoses. Take care not to get debris inside air piping. Drill a 1-1/8" hole in the side of the septic tank riser (the riser which is being used to install the BioMaze® Pods) making sure it is above the wet season water table. Dig a shallow trench between the hole in the riser and the hole in the housing base.

B. Route the air pump discharge hose with the barbed 3/4" male pipe thread fitting through the hole in the housing base and position in the trench and connect to 3/4" Sch 40 PVC pipe using a 3/4" Sch 40 PVC female adapter and Teflon tape. Using proper PVC solvent weld cement procedures, run the 3/4" Sch 40 PVC pipe and any necessary fittings in the trench to the riser. Run the pipe into the hole in the riser approximately 2". Each Aeration Pod will have a hose and a barbed 3/4" male pipe thread fitting which must be connected to the 3/4" Sch 40 PVC pipe. Using 3/4" Sch 40 PVC female adapters and Teflon tape and other appropriate 3/4" Sch 40 PVC fittings make connections to the 3/4" Sch 40 PVC pipe. Seal the 3/4" Sch 40 PVC pipe to the riser using a state and county approved mastic or seal tight gasket that meets ASTM C 990.



RioVation®



Air Pump & Housing
with Integrated Alarm.
Comes pre-assembled!



4. BioMaze® Suspended Biofilm Generator™ (SBG™) Start-Up Instructions

- A. Confirm the male electrical plug from the air pump is connected to the female cord plug from the alarm assembly. Plug the male plug on the cord from the alarm assembly into a 120 volt outlet. The alarm may momentarily sound before the pressure comes up. Now, looking into the riser you should see good mixing or turbulence above and around the Aeration Pod(s).
- B. Confirm there are no leaks in the piping between the air pump and diffusers. Backfill the shallow airline trench. Reinstall the required riser lid with security screws, and any other required riser safety devices. Close the hinged Air Pump Housing and install the closure screw. *The septic tank is now converted into a BioMaze® Suspended Biofilm Generator™ (SBG®).*



**The RioVation® BioMaze®
Suspended Biofilm Generator™
(SBG®) conversion kit
Model BM2624 includes:**

← 2 EA – BioMaze® Aeration Pods with
Attached Diffuser & Air Hose

← 4 EA - BioMaze® Media Pods

← Air Pump & Housing with Integrated
Alarm

HOW to Maintain the RioVation® BioMaze® Suspended Biofilm Generator™ (SBG®)

The septic tank is now a Suspended Biofilm Generator™ (SBG™) that actively treats the influent. By utilizing biofilm microorganisms (bacteria), the generator converts the wastewater to a clear, odorless effluent high in dissolved oxygen and aerobic bacteria & total nitrogen reduction of greater than 50%. As with any biological or mechanical system, it is recommended that the Suspended Biofilm Generator™ (SBG®) receive routine inspection and service. This can be done by a professional installer. It is recommended to be performed every 6 (six) months with the following steps.

1. Remove the security screws and riser lid from the septic tank along with any other security devices to gain access. Remove the security screw from the Air Pump Housing with Integrated Alarm and hinge open.
2. Make a sample bottle using a clear cylinder about one pint in size. Attach the bottle to a 4' or longer handle using appropriate tape. (3/4" PVC pipe works well)
3. Next, catch a sample for visual inspection from inside the treatment compartment, about six (6") inches under the liquid level. Upon inspection the effluent should have a non-offensive odor and be fairly clear in color.
4. Take a sludge core sample and record profile of compartment from top to bottom (Sludge depth and clear liquid depth).
5. There should be significant turbulence above the Aeration Pods caused by the rising air bubbles. Proper aeration in the Suspended Biofilm Generator™ (SBG®) is maintained by the following maintenance operation.

- A. Clean or replace the air pump intake filter every six (6) months. Disconnect the pump from the power source, then removing the screw on the air pump cover. Remove the cover and the filter. Replace with a new one or wash the existing filter in mild soap and water, then rinse, dry and reinstall, replacing the cover and the screw.
6. Always properly reinstall any related safety devices and lids and the access riser cover(s) with security screws. Reconnect Air Pump to the power source. Close the Air Pump Housing with Integrated Alarm and reinstall the closure screw.

Pumping and Cleaning the Septic Tank and BioMaze® Pods

As with all septic tanks, the septic tank converted to a Suspended Biofilm Generator™ (SBG™) will require periodic pumping and cleaning. This is usually necessary every 2 to 4 years but can vary with loading. Pumping should only be performed by a licensed septic tank pumper qualified to perform this task.

To pump the tank, remove the riser lids. Remove each BioMaze® pod from the tank via the access riser using the retrieval line connected to each pod. As you remove each pod, hold them above the water line within the riser and spray them off with a garden hose to remove loose biofilm and foreign debris. Exercise caution to ensure biofilm and debris are rinsed into the tank. Use care so as not to damage the pods. Pump the tank. *NOTE! When pumping, take appropriate precautions and refill the tanks immediately. Leaving the tank(s) empty could result in the tank(s) floating to the surface.* Reinstall all the pods according to the original installation instructions in this manual. Make sure the Aeration Pods have good airflow. Always properly reinstall any related safety devices and the access covers of the risers along with security screws.

Diffuser Stone Replacement

With the riser lid and any safety devices removed, use the retrieval line attached to each BioMaze® aeration pod to lift and remove the pods from the tank through the access riser. As you remove each pod, hold them above the water line within the riser and spray them off with a garden hose to remove loose biofilm and foreign debris. Exercise caution to ensure biofilm and debris are rinsed into the tank. Use care so as not to damage the pods. Note where and how the diffuser assembly is attached to the pod. You may want to take a picture for reference. Remove the zip ties from the diffuser and unscrew the diffuser from the 3/4" male pipe tread fitting clamped to the hose. (See diffuser pictures below) With the diffuser in your hand remove the stainless-steel screw holding the assembly together. Disassemble and remove the stones and gaskets taking note of the POSITION of each component. Reassemble in the reverse order using new gaskets and stones. Replace the stainless-steel screw holding the assembly together. Make sure to align gaskets and diffuser stones properly so as to get a good airtight seal between each stone and the assembly. Tighten the completed assembly firmly by hand. Screw the diffuser assembly back on the 3/4" male pipe thread fitting clamped to the hose and tighten with wrenches using caution so as not to overtighten. Reattach the diffuser with the new zip ties provided in the kit making sure the diffuser is located in its original position on the pod. Reinstall the BioMaze® Aeration Pods back into the tank according to the installation instructions in this manual. Always properly reinstall any related safety devices and the access cover(s) of the tank risers along with security screws. (The replacement stone and gasket kit is available on our website.)

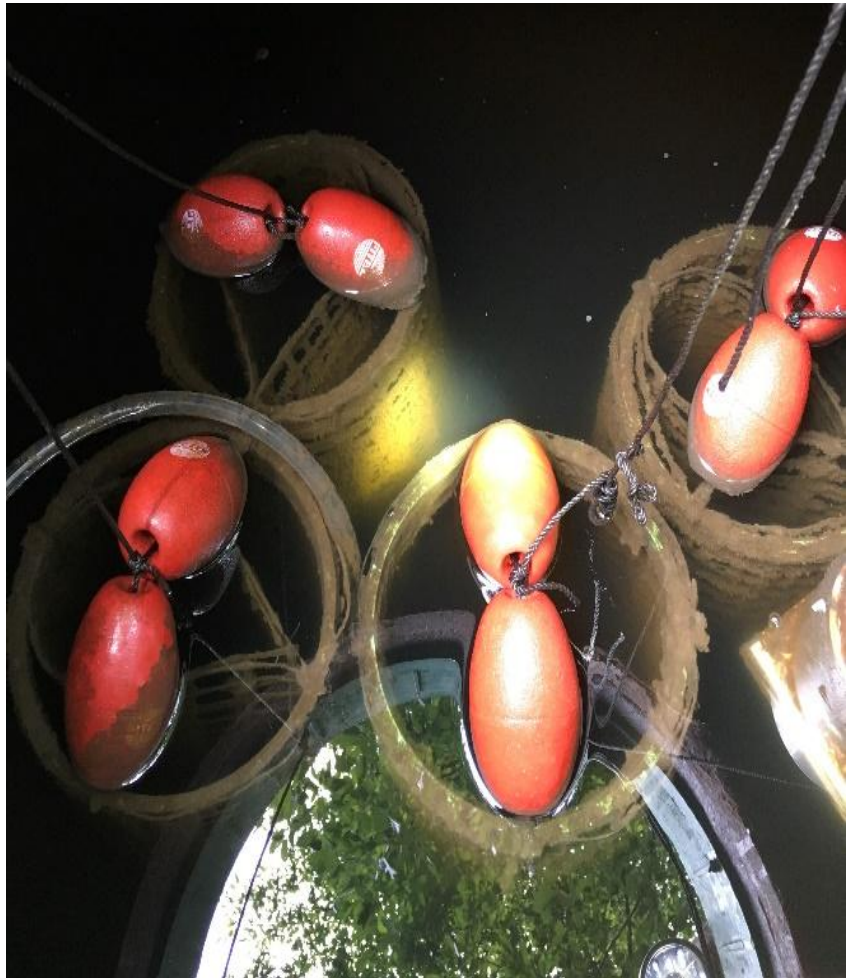
BioMaze® Porous Fine Air Diffuser Stone - ASSEMBLY





← **Effluent Sample**
*from a properly
 operating RioVation®
 BioMaze® Suspended
 Biofilm Generator™*

Mature Biofilm →
*On the pods
 producing clear,
 odorless effluent*



RioVation® BioMaze® Model BM2624 Single Compartment Septic Tank * 2025-07-09

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 Patents Pending

DESIGN BASIS DATA
BioMaze® Model BM2624

Septic Tank Capacity

Design Flow	Up to 500 GPD
Septic Tank Size and Hydraulic Capacity	750 – 2,000 gallons
Hydraulic Retention Time (at Design Flow)	36 -96 hours

Septic Tank Loading Rates

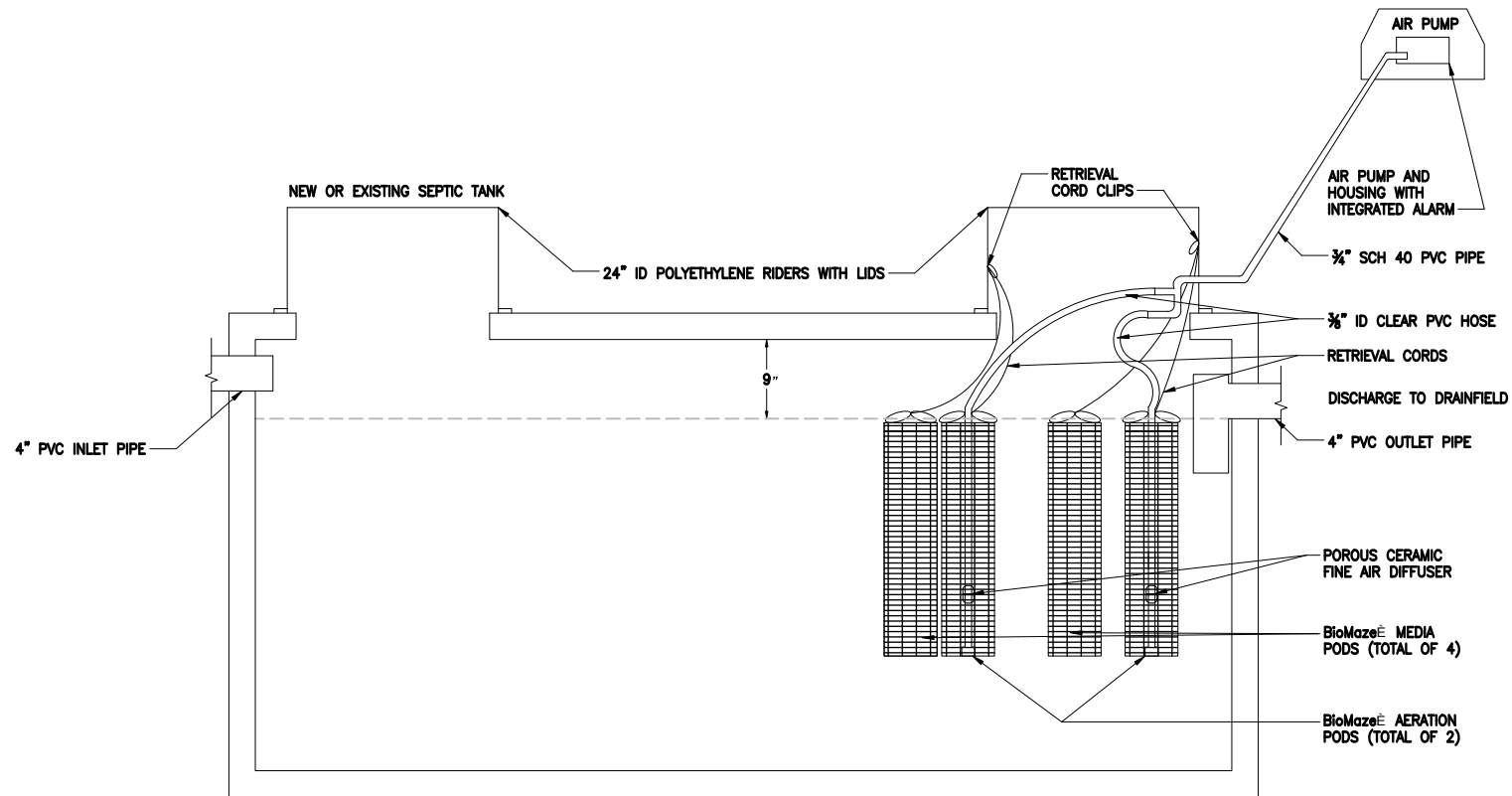
BM2624	500 GPD AT 100 MG/L Total Suspended Solids
	BOD Loading (lb./day) = 1.25

AIR PUMP

Model#	XP80 HIBLOW
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RioVation® BioMaze® BM2624

Suspended Biofilm Generator® SBG® One Compartment Septic Tank Installation



1 DETAIL - NITROGEN REDUCING SUSPENDED BIOFILM GENERATOR™

JUNE 10, 2025

PATENTS PENDING

