ANUA

PuraSys SBR

Reference Manual

Only models bearing the NSF logo
and designated PS1-XX are certified to NSF/ANSI Standards 40 and 245

PuraSys SBR

Reference Manual

Table of Contents

1.0	What's in the Box?	2
2.0	Anatomy of an SBR	2
2.1	Process Overview	3
3.0	System Design	3
3.1	Pretreatment or Septic Tank Sizing	3
3.2	Reactor Chamber or Tank Sizing	4
3.3	Clear Water Pump	4
3.4	Emergency Storage Volume Calculations	4
4.0	System Installation	7
4.1	Site Clearance	7
4.2	Pretreatment or Septic Tank and Reactor Chamber	7
4.3	Reactor Tank	8
4.4	Site Restoration	8
5.0	System Wiring	9
5.1	Power Supply	9
6.0	Reactor Venting and Plumbing	9
6.1	Reactor Venting	9
6.2	Reactor Plumbing	10
7.0	System Startup	10
8.0	Smart Control Panel Overview	10
9.0	Maintenance	11
9.1	Clarity Test	11
9.2	Sludge (Biomass)	11
10.0	Troubleshooting	12
11.0	Owner Use	13
12.0	Owner's Duties	13
13.0	Owner Checklist	14
14.0	Warranty for PuraSys SBR	14

If you require further information, please contact customer service at:

ANUA

P.O. Box 77457 ■ Greensboro, NC 27417
T: 336-547-9338 ■ F: 336-547-8559
info@anuainternational.com

1.0 What's in the Box?

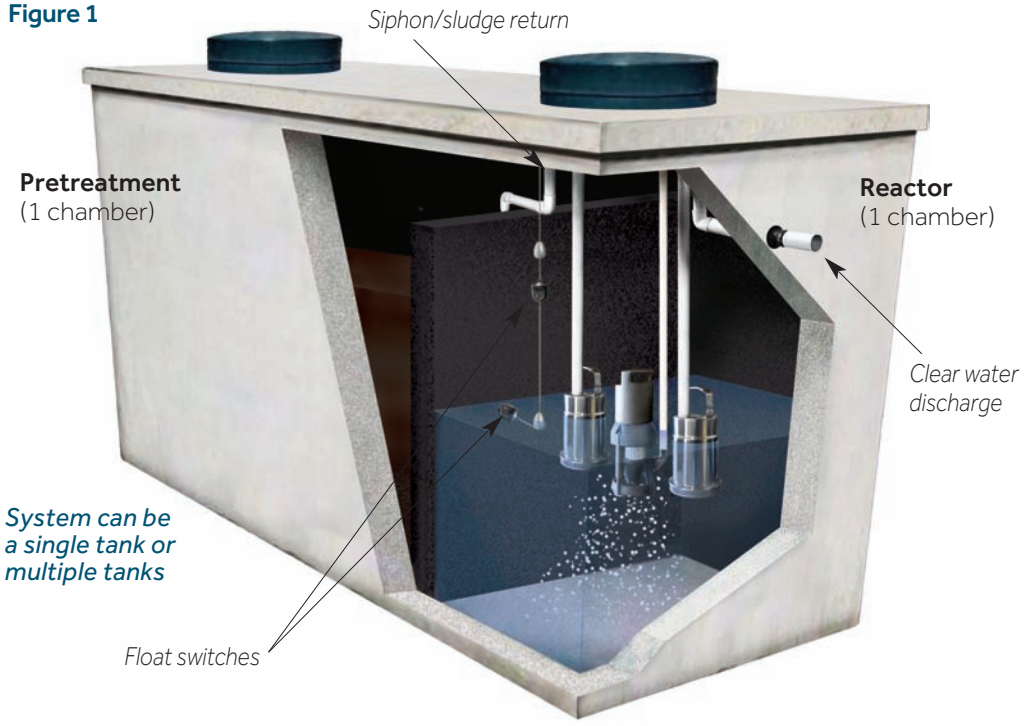
PuraSys SBR Models PS1-4 through **PS1-8** (≤800 gpd) include (1) **Novair 200 Aerator.**
PuraSys SBR Models PS1-9 through **PS1-14** (≤1,400 gpd) include (1) **Novair 600 Aerator.**
Additionally, each system comes in a box with the following components:

Controls	(1) Anua
Optional controls add-on	(1) Autodialer
Junction box	(1) Anua w/2 float grips, 2 pump grips, & 1 aerator grip
Siphon/sludge pump	(1) Goulds STS31
Clear water pump	(1) Goulds STS31 (see note 3)
Float switch	(2) Alderon (included with panel)
PVC stand kit, aerator	(1) Anua A-STAND-PS
PVC stand kit, pump	(2) Anua P-STAND-PS
Wire tie	(10)
1.25" Schedule 40 union	(2) for PVC pipe
Float bracket	(2) Sim/Tech STF-FHPB 1.25"
Stainless Steel screw for stand mounting clamp	(9) For Sim/Tech STF-FHHW 1.25"
Siphon pipe pre-drilled with 3/8" holes	(1) 1.25", cut length per tank dimensions
Stand mounting clamp	(3) Sim/Tech STF-FHHW 1.25"
J hook wire holder	(2) Sim/Tech STF-JHOOK
Stainless clamp	(4) 2.5" SS Clamp
Pump mounting clamp	(2) MTG-CLMP-SS-AS
Aerator mounting clamp	(1) MTG-CLMP-SS-PS
Air vent	2" Banjo threaded air vent
Sonic dampener 4", aerator	(1)
Vibration dampener 1" x 1.5", aerator	(1)

NOTE: 1. REACTOR TANK MUST BE VENTED! Use vented riser lid or provided vent piping with vent guard.
2. Use 1.25" Schedule 40 PVC piping for sludge pump and clear water pump.
3. For other clear water pump options, contact distributor or Anua.

2.0 Anatomy of an SBR

Figure 1



2.1 Process Overview

1. **Filling**
   Water is moved from Pretreatment to Reactor.

2. **Reaction**
   A mixture of aeration, pausing, and mixing breaks down BOD and allows for nitrification and denitrification within the same tank.

3. **Sedimentation**
   Nothing moves in the Reactor and the solids settle to the bottom, leaving clear water at the top.

4. **Clear Water Discharge**
   Clear water is pumped from the Reactor to the discharge point.

5. **Sludge Return**
   Excess sludge is returned from the Reactor to the pretreatment to maintain a proper sludge age.

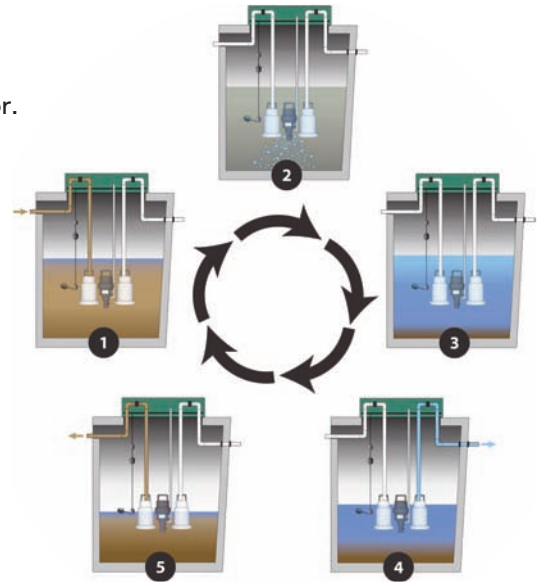


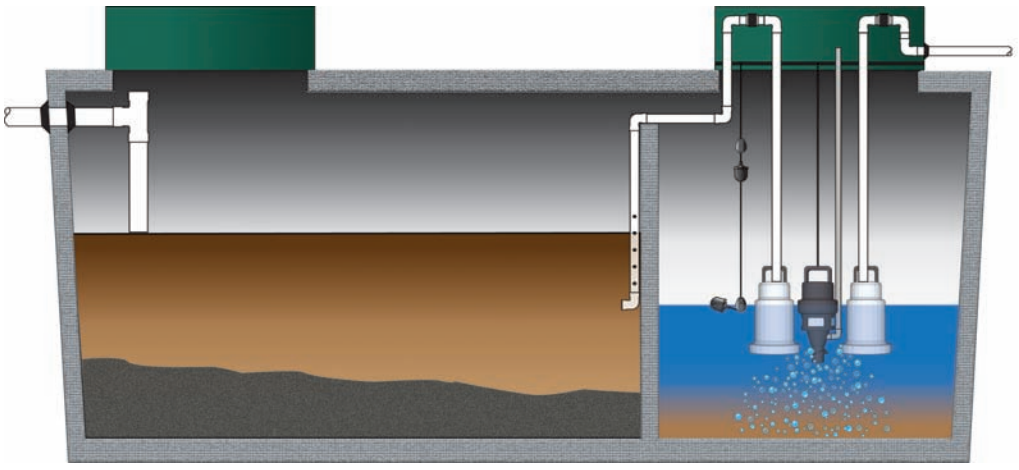
Figure 2 The SBR Process

3.0 System Design

3.1 Pretreatment or Septic Tank

The pretreatment tank, riser(s), and lid(s) must be watertight. The minimum volume shall be 250 gallons per bedroom. Alternatively, the size and configuration shall be in accordance with State or Local requirements for septic tank sizing.

Figure 3



Pretreatment or Septic Tank
(1 chamber tank. Examples include septic tank, pump tank, or holding tank. For 2 chamber configuration, contact Anua)

Reactor Chamber or Tank

3.2 PuraSys SBR Reactor Tank Sizing

Table 1

NSF Reactor Tank Sizing (gallons)					Anua Recommended Reactor Tank Sizing (gallons)		
Model	Flow (gpd)	Reactor Tank Size	Minimum	Maximum	Peak Design Flow (gpd)	Minimum, Approximate	Maximum, Approximate
PS1-4	400	605	545	665	400	240	320
PS1-5	500	756	681	832	500	300	400
PS1-6	600	908	817	998	600	360	480
PS1-7	700	1,059	953	1,165	700	420	560
PS1-8	800	1,210	1,089	1,331	800	480	640
PS1-9	900	1,361	1,225	1,497	900	540	720
PS1-10	1,000	1,513	1,361	1,664	1,000	600	800
PS1-11	1,100	1,664	1,497	1,830	1,100	660	880
PS1-12	1,200	1,815	1,634	1,997	1,200	720	960
PS1-13	1,300	1,966	1,770	2,163	1,300	780	1,040
PS1-14	1,400	2,188	1,906	2,329	1,400	840	1,120

NOTE: The minimum and maximum volumes in these tables are guidelines for standard kits. The volumes can vary from the values in the table. Consult with Anua for alternate designs.

3.3 Clear Water Pump

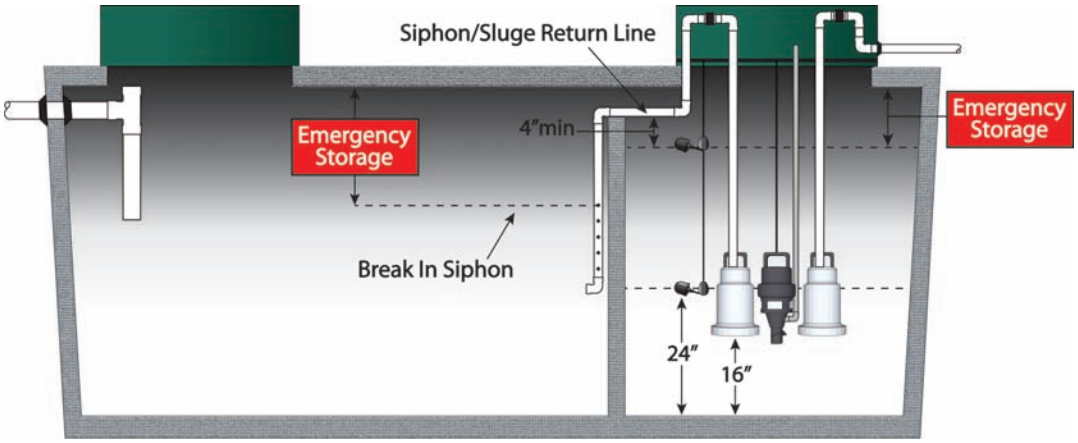
The clear water pump (discharge pump) is an integral part of the system. This is advantageous since the SBR is essentially a primary tank, treatment unit, and pump tank all-in-one. The pump provides timed dosing for a downstream component such as a polishing filter or drainfield. The standard kit contains a typical 0.5 HP effluent pump. A larger pump can be included in the kit where required. The clear water pump can be used to discharge to the following:

- Polishing unit such as the Puraflo peat fiber biofilter with optional pad dispersal
- Gravity trench or bed
- Low Pressure Pipe (LPP) drainfield
- Drip irrigation

3.4 Emergency Storage and Alarm Conditions

PuraSys SBR controls the movement of effluent through the system in a timed sequence of batches. PuraSys SBR incorporates a clear water discharge pump. Since treated effluent is timed dosed from the system, adequate emergency storage must be provided. This is typically provided in the pretreatment tank due to the operational sequence of the controls. For a one tank, 2-compartment configuration, the reactor chamber can be included in the emergency storage calculations.

Figure 4



Emergency storage in typical two compartment tank

1. **One Tank, 2-Compartment Configuration**

   The total emergency storage volume is calculated based on the available volume in the pretreatment tank and the reactor chamber/tank above the normal operating levels to the inside tank lid. Since the chambers are connected via the air space above the baffle wall, volume in both chambers can be counted for emergency storage. In some jurisdictions, the riser volume can be counted for emergency storage. Emergency storage can be calculated as follows:

   - Pretreatment tank: Determine the volume between the top siphon hole to the top of the tank (inside lid).
   - Reactor chamber: Determine the volume between the high water alarm and the top of the tank (inside lid).
   - If allowed per local jurisdiction, determine the volume in the risers.
   - Total storage volume = Pretreatment + Reactor + Risers

2. **Two Tanks Configuration**

The total emergency storage volume is calculated based on the available volume in the pretreatment tank above the normal operating level to the inside tank lid. In some jurisdictions, the riser volume can be counted for emergency storage. Emergency storage can be calculated as follows:

- Pretreatment tank: Determine the volume between the top siphon hole to the top of the tank (inside lid).
- If allowed per local jurisdiction, determine the volume in the risers.
- Total storage volume = Pretreatment + Risers

3. **Alarm Conditions**

An alarm will trigger under the following conditions:

- High water float activated in reactor chamber.
- Aerator current <1 or no current.
- Siphon/sludge pump current <1 or no current.

The operational sequence is outlined below:

- If the clear water discharge pump fails or malfunctions, a high water condition will occur in the reactor chamber. The high water condition will trigger the an alarm. The high water alarm will suspend operation of the siphon/sludge pump.
- If the current sensor does not read proper current to the aerator, an alarm will trigger. The aerator alarm will suspend operation of the siphon/sludge pump.
- If the current sensor does not read proper current to the siphon/sludge pump, an alarm will trigger. At this point, this pump is not operational.

Figure 5

4.0 System Installation

4.1 Site Clearance

- Clear site vegetation as required (minimize site disturbance).
- Provide sufficient access to proposed system.

Installation Warning
Do not backwash a water softener into the system.

4.2 Pretreatment or Septic Tank and Reactor Chamber

- Supply and install pretreatment tank and sewer pipe from the dwelling in accordance with applicable State or Local regulations. The pretreatment tank must be watertight against ground and/or surface water infiltration and exfiltration.
- Install pretreatment tank on stable, compacted fill (e.g. stone ≤1" or similar material).
- Pretreatment tank must be backfilled with suitable material as recommended by the manufacturer. Backfill must be free of debris and large or sharp objects.
- Install water tight risers over access ports to provide access for maintenance and sludge removal.
- Install aerator stand, siphon/sludge pump stand, clear water discharge pump stand, and other components in reactor chamber per installation checklist. The aerator, siphon/sludge pump, clear water discharge pump, timer float, and high water alarm float heights are factory set.
- Install siphon/sludge return line from the pretreatment compartment to the reactor chamber.
- Secure the pre-drilled siphon pipe in the pretreatment tank with the top 3/8" hole at the correct height as indicated in the design.
- Connect the clear water pump discharge line to the drainfield in accordance with applicable State or Local regulations.
- Backfill and grade around the pretreatment tank to prevent infiltration of surface water. *See PuraSys SBR typical drawings for further details on layout.*

Table 2 PuraSys SBR Pretreatment Tank Siphon Pipe Dimension from Tank Bottom and Pump Out Requirements

Liquid Depth (inches)	Siphon Pipe 90° Elbow Height from Inside Tank Bottom (inches)	Depth of Sludge Requiring Tank Pumping (inches)	Combined Volume of Scum & Sludge Requiring Tank Pumping
36	14	9	1/3 or 33%
38	15	10	
40	16	10	
42	17	11	
44	18	11	
46	18	12	
48	19	12	
50	20	13	
52	21	13	
54	22	14	

NOTE: For tank depths <36" or >54", please consult Anua.

4.3 Reactor Tank (if applicable, for two tank systems)

- Supply and install the reactor tank in accordance with applicable State or Local regulations. The reactor tank must be watertight against ground or surface water infiltration and/or exfiltration.
- Install reactor tank on stable, compacted fill (e.g. stone ≤1" or similar material).
- Reactor tank must be backfilled with suitable material as recommended by the manufacturer. Backfill must be free of debris and large or sharp objects.
- Install water tight risers over access ports to provide access for maintenance and sludge removal.
- Install aerator stand, siphon/sludge pump stand, clear water discharge pump stand, and other components per installation checklist. The aerator, siphon/sludge pump, clear water discharge pump, timer float, and high water alarm float heights are factory set.
- Install siphon/sludge return line from the pretreatment tank to the reactor tank in accordance with applicable State or Local regulations. The siphon/sludge return line must be adequately supported to prevent damage during backfilling.
- Secure the pre-drilled siphon pipe in the pretreatment tank with the top 3/8" hole at the correct height as indicated in the design.
- Connect the clear water pump discharge line to the drainfield in accordance with applicable State or Local regulations.
- Backfill and grade around the reactor tank to prevent infiltration of surface water.

4.4 Site Restoration

- The riser lids must be installed above grade with the ground landscaped to divert storm water away from the area.
- Backfill should be suitable, loose, workable material.
  Backfill must be free of debris and large or sharp objects.
- Compact backfill sufficiently to adequately prevent settlement.
- Landscape (e.g. grass seed, sod, straw, landscape stone, xeriscape, etc.) the sloped backfill area and any trench excavation
  lines with a suitable indigenous seed variety or use other methods.
- PROVIDE EROSION PROTECTION AS REQUIRED PER DESIGN PLAN.

Installation Warning
If you are not using an air break on the clear water pump discharge pipe, then install a check valve!

Construction Warning
During construction, harmful chemicals such as paint and solvents can harm the system microbes if dumped down the drain. These items should not be allowed into the treatment plant.

5.0 System Wiring

The cables are coded to match the connections between the aerator, pumps, and float switches to the junction box and control panel.

The smart control panel is housed in a NEMA 4X enclosure. The wiring diagram and instructions are located inside the panel. **Incoming power must be 240V, 1 Phase and 120V, 1 Phase.**

Figure 6

5.1 Power Supply

The system must be wired by a person qualified to do electrical work per the applicable State or Local electrical code.

The control panel requires two separate incoming power feeds as follows:

- **20A, 2 Pole, 240V breaker**
- **20A, 1 Pole, 120V breaker**

Recommended Surge Suppression

In order to add extra protection to the control panel, the addition of external surge suppression is recommended.
The surge suppressor should be attached in parallel to the junction on the main power line.

6.0 Reactor Venting and Plumbing

6.1 Reactor Venting

- Aerator must be supplied with fresh oxygen.
- Direct aerator air tube into vent housing and cut to proper length to insure hose will rest inside of vent housing without impeding air flow to aerator.
- Air vent included in the kit is not required for use. However, air tube must exit to atmosphere in order to obtain fresh oxygen to inject into aerator
- Ensure the aerator is properly secured to the riser with the clip included in the kit.

6.2 Reactor Plumbing

- Siphon/sludge pump and clear water pump must be plumbed with quick disconnects. Unions are included in the kit.
- If you are not using an air break on the clear water pump discharge pipe, then install a check valve.
- In cold weather climates subject to freezing, slope clear water pump pressure line for drainback to reactor chamber/tank and do not install a check valve.
- Ensure the pumps are properly secured to the riser with the clips included in the kit.

7.0 System Startup

Once the system is installed, the pumps, aerator, and float switches must be tested to ensure that they each work. The bottom float switch must be in the 'up' position in order to test the clear water pump.

The tank(s) should be filled with water in order to verify tank(s)/risers watertightness. After completion of the watertightness testing, the system should be started to check for any plumbing leaks. When start-up is completed, the system can be left 'on'. The system will remain in vacation mode until water begins to flow from the facility.

8.0 Smart Control Panel Overview

The smart control panel is designed be simple and easy to operate. All key adjustments and readings can be accessed through the four button keypad. Operational data is stored in the PLC.

The smart control panel optimizes the SBR process. The following settings can be adjusted:

- Aeration time per cycle (min)
- Fill pulse time (sec)
- Sludge return time per cycle (sec)
- Clear water pump timer settings (min)

The smart control panel records the following information:

- Siphon/sludge pump run time
- Siphon/sludge pump cycle count
- Clear water pump run time
- Clear water pump cycle count
- Aerator run time
- Aerator cycle count

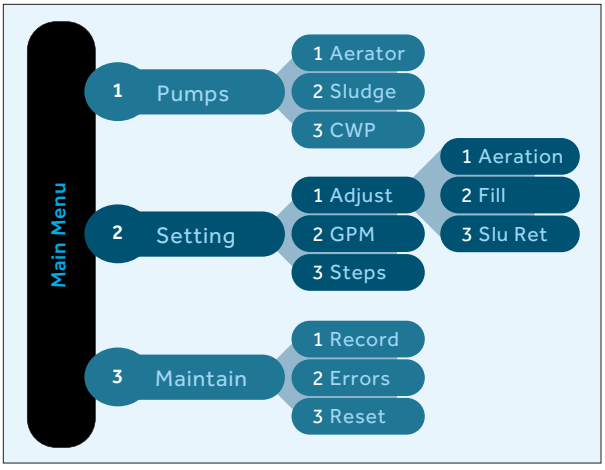


Figure 7

The controller display and setting instructions are located inside the panel. Mechanical components can be manually operated using the HOA toggle switches located inside the smart control panel.

9.0 Maintenance

Maintenance steps:

1. Check the smart control panel for alarms or for errors.
2. Check pretreatment tank and take a sludge reading (see right).
3. Open reactor chamber lid. Check for noxious odor and take a sludge sample
4. If the system is in sedimentation mode and prior to clear water discharge, you may be able to perform a clarity test (see Section 9.1).
4. Manually test the pumps and aerator.
5. Make adjustments and take readings.
6. Replace cover and record maintenance.
7. Give a copy of the maintenance report to the system owner. File the maintenance report with regulatory authority as required by law.

Figure 8

9.1 Clarity Test

The clarity test may be used to visually determine effluent quality. To perform the clarity test, the service provider places an eight-inch disk with alternating black and white colored quadrants just above the sludge blanket in the reactor chamber. Be careful not to disturb the sludge blanket! If the disk is visible when the reactor chamber is 1/3 full, then the effluent quality passes the clarity test.

9.2 Sludge (Biomass)

A mature system should have a healthy, one-foot layer of sludge at the bottom of the reactor chamber. This one-foot sludge layer is maintained at a constant level due to the sludge pump portioning excess sludge back to the pretreatment tank. A sludge reading requires a tool, such as a Sludge Judge, that allows you to pull a sample and see the sludge profile. If a recent aeration event occurred, the service provider must wait about 30 minutes prior to obtaining a sludge sample.

Figure 9

Four things to take note of when looking at the sludge:

1. Size
2. Color
3. Settleability
4. Volume (level)

10.0 Troubleshooting

Mechanical failure may be pumps, aerator, or float switches

- Replace failed component
- Test component for proper operation

Field Issue

- Determine if there is a blockage or break in any lines.
- Check for signs of high groundwater
- Check for signs of damage by animals or insects
- Check for signs of damage by any type of motor vehicle
- Check for signs of damage by any plant or tree root intrusion

Infiltration or Exfiltration

- Identify leak using chalk, camera, or smoke
- Repair leak and test

Electrical/controls

- Test power supply for volts
- Test pumps and aerator for volts and amperage draw.
- Replace controls or other electrical components that are malfunctioning or non-operational

11.0 Owner Use

The PuraSys SBR is similar to a scaled-down, automated version of a municipal treatment plant. PuraSys SBR is designed to treat typical domestic sewage. The SBR treatment process can be interrupted or harmed by chemicals designed to kill microorganisms or by physical matter other than toilet paper. The owner "Do's and Don'ts" for PuraSys SBR are similar to a typical septic tank system. Many owner "Do's and Don'ts" guides for septic tank systems are available online.

DO:

- Think before you put anything down the sink, toilet, or drains.
- Read all labels and use the manufacturer's recommended amounts for all household cleaning products.
- Use cleaning products little and often so the unit isn't overloaded.
- Spread your clothes washing throughout the week.
- Keep your pretreatment tank and reactor chamber lids accessible for inspections and pumping.
- Have your pretreatment tank pumped regularly and checked for leaks or cracks.
- In the event of the alarm sounding after electrical storms or power failure, check if the electrical circuit-breakers tripped off by first turning them off and then turning them back on again.
- **Call your Authorized Service Provider with issues or questions.**

DON'T:

- **Flush foreign objects** - these can damage pumps and cause blockages.
- **Flush wipes** - these do not degrade like paper and can cause problems with treatment.
- **Pour grease down the drain** - these harm microbes in the system and can cause blockages.
- **Pour toxic chemicals down the drain** - these can kill microbes in the system.
- **Pour large volumes of cleaning chemicals and bleach down the drain** - use these items in moderation.

The system will detect malfunctions, such as leaking toilets. The system is also equipped with "party" and "vacation" modes to accommodate situations where flow is expected to be significantly more or less than typical usage.

The owner should maintain a service contract with an authorized service provider for the life of the system. Routine service should be performed twice a year or more frequently per usage.

In the event of the alarm, an audible alert and visual alert will be activated. The owner should call the service provider if an alarm is triggered.

12.0 Owner's Responsibilities

- The owner is required to use and maintain the system in accordance with the guidelines contained within this manual.
- The owner should not have anyone work on the PuraSys SBR system except an authorized service provider.
- The owner is ultimately responsible to file any reports or other documentation required by the regulatory authority.
- Prior to use, the owner is responsible to register the system with Anua.
- See checklist in Section 13.0.
- **Failure to adhere to these guidelines will result voiding the warranty outlined in Section 14.0.**

13.0 Owner Checklist

☐ The service provider has explained the operation of the system and answered my questions satisfactorily.
☐ The service provider has shown me the list of items that shall not be allowed into the system.
☐ I am aware that only the service provider may maintain or repair the system, including scheduling pumpouts, or else my warranty can be voided.
☐ I am aware that I am to report any alarm, bad odor, or strange noise to the service provider immediately.
☐ I am aware the the system needs to be maintained regularly in order to operate properly for the life of the system.
☐ I have the contact information for my service provider.
☐ I grant the service provider, distributor, and Anua reasonable access to the treatment system to provide routine maintenance and quality control checks. _____ **Initials**
☐ I have registered my system with Anua.

14.0 Warranty

Warranty:

- Anua warranties the PuraSys SBR for a period of two years, unless otherwise specified by the regulatory authority, from the date of delivery. This warranty is subject to the *Terms and Conditions* section and the PuraSys SBR being operated in accordance with the parameters outlined in this manual and the owner complying with the parameters outlined in this manual.
- In addition, Anua will, at its own expense, repair and replace any defective parts of the PuraSys SBR, which manifests itself within two years, unless otherwise specified by the regulatory authority, from the date of delivery.

Terms and conditions:

- This warranty does not apply to any defects whether patent or latent, and whether workmanship or materials or design of works carried out by any independent contract, or any failure due to accidental or malicious damage, or failure to comply with recommendations for operations and maintenance, or unit abuse, fair wear and tear, frost, storm damage, infiltration of storm or surface water or any other such climatic conditions or acts of God generally.
- In particular note that this warranty will not operate unless the customer can produce written evidence of the system having been desludged as required.
- Notwithstanding this warranty if the cost of remedial work is increased due to delay on part of the customer informing of the problem, we reserve the right to invoice the customer for such increased cost.
- This warranty is strictly limited to the replacement of product supplied by Anua. It specifically excludes all other alleged headings of loss, including consequential loss.

P.O. Box 77457
Greensboro, NC 27417
T: 336-547-9338
F: 336-547-8559
info@anuainternational.com

anuainternational.com