

OPERATION & MAINTENANCE MANUAL



RESIDENTIAL WASTEWATER TREATMENT SYSTEM

MODEL: SA-500 GPD
ANSI/NSF CLASS 1

This system has been tested in accordance with the criteria as set forth in ANSI/NSF Standard 40 and is hereby certified as conforming with requirements for classification as a Class 1 Wastewater Treatment Plant.

Operation & Maintenance

PROCESS DISCRPTION:

- The *SOLAR AIR* single family wastewater treatment plant is an extended aeration activated sludge process. This type of treatment depends primarily upon the use of air that is introduced to the wastewater from your home as soon as it enters the treatment unit. When air is introduced it promotes the growth of aerobic organisms that breakdown the organic solids in the wastewater producing inorganic and stable organic solids. The use of air is called aeration and this aeration provides dissolved oxygen, mixing of the wastewater and enough time for the organisms or bacteria to breakdown the organic solids that have entered the wastewater treatment plant.
- In the aeration chamber the wastewater should be brown in color. The liquid in this compartment is pneumatically mixed to keep the waste in suspension. As the wastewater leaves the aeration chamber it enters a quiet zone where no mixing occurs. The quiet zone is referred to as a clarifier.
- In the clarifier the solids separate from the liquid and settle to the bottom of the clarifier, that matter is called sludge. This sludge contains dissolved oxygen and this oxygen activates the bacteria it contains. This activated sludge is returned to the aeration chamber to be re-mixed. The sludge mixes with the incoming wastewater and this mixture of return sludge and wastewater is referred to as mixing liquor. This mixed liquor flows back into the clarifier, the solids separate and return again to the aeration chamber.
- The water that separates from the solids in the clarifier and flows out of the wastewater treatment plant is referred to as the effluent.
- Every *SOLAR AIR* sewer system has as part of its equipment packages a **control box** that is especially designed for operating and sensing failures of the system. This box should be located next to the blower above the tank and in a conspicuous area as to be seen daily. If the water level within the system rises five inches above the normal operating level the red light and a buzzer on the control box will go off simultaneously. In the same way the control box by means of a pressure switch and contactor, the alarm will be set off in the event of blower failure.
- It is **important** that the installer or maintenance provider has a sticker on the control box that gives the homeowners the proper information to enable him/her to contact you in the event that service is required.

PHYSICAL DESCRIPTION OF THE 500 GPD SOLAR AIR

- The *SOLAR AIR* is a concrete three-compartment wastewater treatment system that was designed for residential or light commercial use. Each tank is reinforced with wire mesh and poured with no less than a 3000 psi. concrete mix. There are presently three sizes offered a 500, 1,000 and 1,500 gallon per day. Each of these systems is alike in the way they function, with larger tanks and blowers to accommodate the larger wastewater flows.
- The first compartment of the *SOLAR AIR* system is a built on **pretreatment** or (trash trap) which has a 353 gallons capacity. The 1000 & 1500gpd systems will have a slightly larger capacity, and will require a separate tank. This compartment receives the raw sewage from the source. This compartment will trap most non-biodegradable waste from entering the aeration compartment. Heavier solids will settle to the bottom, while allowing lighter waste such as paper products, plastics, grease, cigarette butts etc. to float to the top. All of the solids, which will decompose in water together with the liquid waste, will then flow through a 4" T baffle into the aeration compartment.
- The second area that the wastewater goes into is called the **aeration compartment**. This compartment has a 565 gallons capacity. In this compartment air, which is supplied by a Thomas TA 0030-P Rotary compressor, located on top of the system under the concrete housing or against the building for better accessibility, is discharged into the contents of this compartment. This air will circulate or roll the contents with sufficient force to keep the solids in the aeration tank suspended in the liquid. Air is produced from the blower and is forced through a specially designed diffuser bar which creates small bubbles. As these small bubbles rise through the water in the aeration compartment it creates an oxygen rich environment that becomes a favorable environment for the growth of aerobic bacteria. These microscopic organisms digest the solids in the wastewater within a 24-hour period. This compartment has been sized at 565 gallons, more than adequate for the normal size home. The average sewage flow from an individual residence has been established to be 400 gallons per day.
- The final compartment that the wastewater enters is the **clarifier**. This compartment holds 186 gallons. When the contents of the aeration chamber enter the clarifier, the treated solids are no longer subjected to the rapid circulation of the aeration compartment. The solids then settle to the bottom and are returned to the aeration compartment by a slight vacuum created by the rolling action of the liquid in the aeration compartment. This vacuum causes the solids to flow through a 4" opening that runs along the bottom of the tank, between the clarifier and the aeration compartment wall, where they are further digested. Clear liquid is discharged from the clarifier through a 4" T baffle. The liquid is drawn from the bottom of the T baffle, which is approximately 18" below the surface. The clear liquid, discharging from the tank, contains sufficient dissolved oxygen to guarantee a stable effluent, suitable for discharge under acceptable conditions.

Maintenance Schedule:

- Every wastewater treatment system on the market needs periodic maintenance in order to maintain clear, odorless and environmentally safe effluent. The information to follow is not etched in stone. You will find that different installation and applications will dictate a sometimes-tailored maintenance schedule. For instance, we recommend the air filter on the blower to be washed every six months, however if the system is located on a dirt road it is likely that the filter will need to be washed more frequently. The same would hold true with pumping frequencies. A family of three will not need their systems solids removed as often as a family of five or six with three members being female. If the following maintenance schedule is used, along with some common sense and good judgement, you can save the homeowner money on costly repairs and downtime.
- **OWNERS'S KNOWLEDGE AND AWARENESS IS THE FIRST STEP TO ANY SUCCESSFUL MAINTENANCE PROGRAM!**

Solids Removal:

- The entire system should be **pumped out every 3-4 years** by a licensed sewage hauler. In most cases there will not be a riser above the ground to access the pre-treatment compartment, but there is an access cover that will have to be dug up. This is an important area to pump out, being that this is where most of the trash will be. The aeration compartment and clarifier can be pumped out from the riser under the blower or the access lid that divides the two compartments. Keep in mind that the sole purpose of your system is to break down all incoming biodegradable waste back to its original form (dirt). The excess waste will begin to build up over time and **must be** disposed of.

Blower & Filter maintenance:

- **Air filter** on the blower should be **washed** with soap and water **every six months** or sooner if needed. Make sure the filter is completely dry before turning the blower back on.
- Neither the Linear nor the rotary blower require any oil or grease, however the blower is the heart of the unit and should be treated as such.
- It is important that the blower be kept in a dry place. Always consider heavy rains or low areas prone to flooding, being that the warranty does not cover water damage.
- **Keep ants away from the blower!** Damage to the blower due to ants **is not** covered under warranty. This should be explained to the homeowner. It would be a good idea to periodically apply some type of ant poison around the blower to insure some ant deterrence.
- Make sure to go over the "Home Owners Manuel" with the homeowner. Make sure you cover the Homeowner's Responsibilities, especially the part about what they should and shouldn't put into the system. This will eliminate many needless service calls.
- You must also familiarize the homeowner with the basic operating procedures of the control panel, blower and failure sensing devices. This information will save you needless service calls and phone calls in the future.

Effluent Sampling:

- Many states require periodic effluent sampling. In those states where chlorinating is not necessary you may want to make a simple sampling port out of a 4 inch cross. On the bottom of the cross you can glue an 8-inch piece of pipe which is capped on the bottom. Stub out of the tank with a 5-inch piece of pipe. Then glue the cross to this stub out with the 8 inch capped pipe facing straight down. Then you cut another piece of pipe whatever length is required to create a 4-inch access just above grade. You can then extend the effluent line on out from the cross to its final destination. (See Picture Below).
- Make sure to flush out the sampling port before taking a sample. This will insure that you get a more accurate effluent sample.
- No two wastewater treatment systems effluent will test out the same. There are many factors in normal household use that effects the end result of a system's effluent, However many of these factors have been taken into account while testing the *SOLAR AIR*. **Under proper, normal use, SOLAR AIR should meet the following effluent criteria as set forth by ANSI/NSF 40 for a Class 1 Wastewater Treatment System. CBOD equal to or less than 25, TSS equal to or less than 30.**

Failure Sensing

The audio/visual alarm activates when one or more of the following conditions occur:

- 1) *A high water condition tips the alarm float in the up position.*
- 2) *A low-pressure condition is detected due to:*
 - a) No water or low water level in the aeration chamber
 - b) A faulty compressor
 - c) A break or leak in the airline
 - d) A faulty pressure switch
- 3) *No compressor power due to:*
 - a) Compressor on/off switch in the off position (the on/off switch also functions as an alarm test switch when switched to the off position).
 - b) A faulty power source tripped breaker, etc.

If an alarm condition occurs, perform simple checks first.

- 1) *Is the compressor running?*

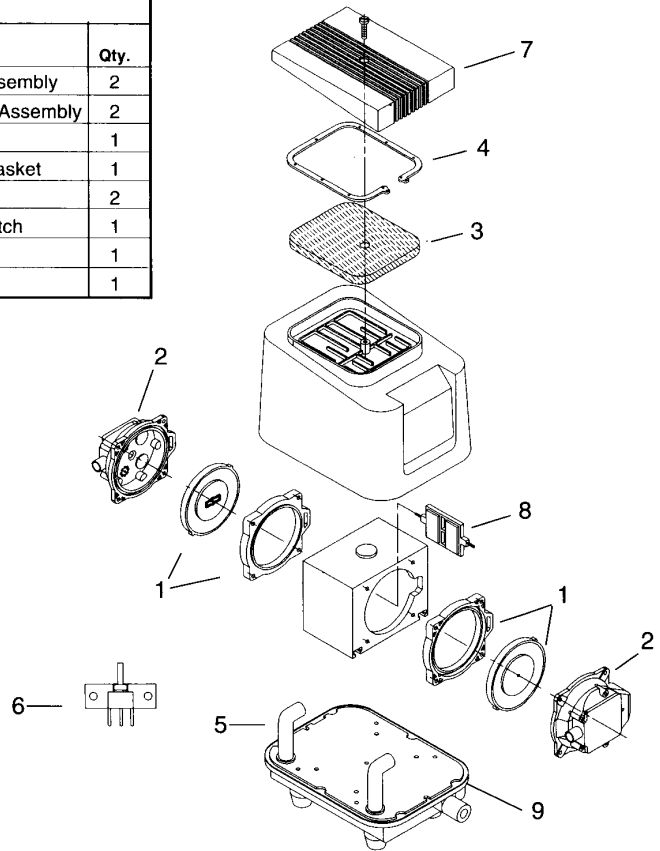
- Yes**
- a) is the water level high enough to suspend the alarm float above the horizontal position?
 - b) Is the water level in the aerator chamber high enough to provide backpressure on the airline?
 - c) Is there a break or leak in the airline?
- No**
- a) is the compressor on/off switch in the on position?
 - b) Is the compressor power source breaker tripped?

DRAWING & PARTS LIST

	MODEL 5078S 5080S 5100S 5120S	MODEL 5150S 5200S	MODEL 5078SE 5080SE 5100SE 5120SE	MODEL 5150SE 5200SE		
Item No.	Part No.	Part No.	Part No.	Part No.	Description	Qty.
1	C51800	C51802	C51800	C51802	Diaphragm Assembly	2
2	C52000	C52700	C52000	C52700	Head & Valve Assembly	2
3	C56301	C56302	-	-	Air Cleaner	1
4	C56002	C56005	-	-	Filter Cover Gasket	1
5	C53900	C53903	-	-	L-Tube	2
6	C50262	C50263	C50262	C50263	Protective Switch	1
7	C53008	C53009	-	-	Filter Cover	1
9	C50284	C50285	-	-	Tank Gasket	1

SHUTTLE ASSEMBLY (ITEM 8)		
Model	Part No.	Qty.
5078S, 5078SE	C50272	1
5080S, 5080SE	C51600	1
5100S, 5100SE	C51601	1
5120S, 5120SE	C51602	1
5150S, 5150SE	C51400	1
5200S, 5200SE	C50265	1

REBUILD KITS (KITS INCLUDE DIAPHRAGM ASSEMBLY AND HEAD & VALVE ASSEMBLY) (PART NOS. 1 & 2)		
Model	Part No.	Qty.
5078S, 5078SE 5080S, 5080SE 5100S, 5100SE 5120S, 5120SE	C50280	2
5150S, 5150SE 5200S, 5200SE	C50281	2



Warning:

Thomas compressors are precision-made, and carefully assembled and wired. Therefore do not disassemble or attempt to repair these products. Only qualified personnel should perform repair service.

Linear 5078-S Blower Parts List

Maintenance:

- Periodic maintenance is required on all linear pumps.
- The air filter/cleaner should be removed and cleaned with soap and water every 5-6 months or as needed.
- A rebuild kit should be installed after every 24 months of continuous operation.
- **KEEP ANTS AWAY FROM THE BLOWER.**

INITIAL WARRANTY

MANUFACTURERS LIMITED WARRANTY

NWSI warrants each wastewater treatment system to be free from defects in workmanship and materials from the date of installation for a period of no more than twenty-four (24) months. When properly installed and registered by the manufacturer or appointed representative, the manufacturers sole obligation under this warranty shall be as follows:

To repair or exchange any component, F.O.B. factory, that in the manufacturer' judgement is defective.

This warranty does not cover any system that has not been properly installed, been flooded by any external means, infested by ants, disassembled by any unauthorized person, anything other than normal household wastewater, or act of nature, this warranty applies only to the treatment system itself and does not include any of the purchasers plumbing, drainage and / or disposal system or house wiring.

The manufacturer is not nor claims responsibility for any delays or damages caused by defective components or materials, which cause losses, incurred by interruption of service or for repairs or replacements of component parts covered by the warranty.

If a purchaser or owner of a *SOLAR AIR* wastewater system wishes a continuing policy, with terms comparable to the initial service policy, it is available and can be obtained from the dealer for those purchasers or owners whose initial service policy has lapsed or expired.

SERVICE POLICY

The total purchase price of a *SOLAR AIR* includes a service policy of twenty-four (24) months. This policy includes all service calls required due to equipment failures, defects, or manufacturer defects.

The plant is to be inspected by the manufacturer or his representative every six months at no cost to the owner. These service calls or for the following:

1. Servicing of the unit will be available within two (2) working days of the owner's request.
2. Adjustment and servicing of the air blower including replacement or cleaning of the filter if necessary.
3. Examination of the aeration chamber and clarifier. Inspection of the mixture or aeration regime and for the presence of sour or offensive odors, color, and turbidity, scum and overflows.
4. Immediate notification of the owner / warrantee in writing of any improper observation which cannot readily be repaired. This notification will advise said owner of the problem and if it is covered by warranty, and estimated date for correction of said problem(s).

There shall be no charge to the owner for any service calls, repairs, or replacements of component parts covered by the warranty for 24 months from the date of installation.

If properly operated and maintained as stated the *SOLAR AIR* will meet or exceed all applicable standards and/or limitations as established by test as required by ANSI/NSF Standard No. 40 / (class 1).

Extended Service Policy

Your Company Name

SERVICE CONTRACT

The authorized **SOLAR AIR** dealer agrees to the following with prepayment of service contract:

During the service period of _____(month\year) a maximum of _____ inspections
Will be performed on the **SOLAR AIR** system for the following address:

(Street name) (City) (State) (Zip)

(Contact person and phone number in case of emergency)

Inspection calls will include the following:

- a. A visual inspection of effluent for coloring and odor.
- b. Sampling of solids in the aeration chamber.
- c. Adjustments if necessary of any mechanical and/or electrical components.
- d. Other service_____

- e. If any malfunctions are found and cannot be fixed at the time of service, the homeowner will be notified when the repairs can be completed.

Additional services, replacements of out-of-warranty parts, waste removal in system; other services offered by installer\representative can be done with written notice for an additional charge.

IMPORTANT: This warranty\service agreement does not cover the cost of service calls, Labor or materials which are required due to " misuse or abuse " of the system; failure to Maintain electrical power to the system; sewage flows exceeding the hydraulic\organic design Capabilities; disposal of non-biodegradable material, chemicals, solvents, grease, oil, paint, etc.; Or any usage contrary to the requirements listed in the owner's manual or as advised by the Authorized service representative.

Charges for parts and additional services can be obtained by contacting:

Authorized Service Representative
(Your Company Name)

Signature of Owner

Date_____

PLANT SPECIFICATIONS

Designation:	“SOLAR AIR (NWSI 500)” Single Family Wastewater Treatment System	
Treatment Capacity:	500 Gallons per day	
Volumetric Capacity:	Pretreatment Chamber	350 Gallons
	Aeration Chamber	560 Gallons
	Clarifier	190 Gallons
BOD Loading:	1 – 1.5 pounds per day	
Electrical Requirements:	120 Volts 60 Hz Single Phase Grounded Receptacle	
Air Blower:	THOMAS 5078S Linear Blower - Intermediate	
Blower Motor:	¼ Hp, Single Phase Volts: 115 Cycle: 60 Hz	
Plant Dimensions:	Outside Width	62 Inches
	Outside Length	98 Inches
	Outside Height	66 Inches
	Air Space	8 Inches
	Liquid Level	52 Inches
	Outside Wall Thickness	2.5 Inches
	Inside Wall Thickness	2 Inches
Plant Structure Material:	Precast Concrete	
	Mix Proportions	
	Cement	400 LBS
	Sand	1413 LBS
	Gravel	1881 LBS
	Ash	70 LBS
	Water	250 LBS or 30.0 Gallons
Mix Characteristics:	Strength	3000 psi
	Slump	4”
	Flyash	15%
	Aggregate	5/8”

Information supplied on Plant Structure Materials by:

Transit Mix Concrete & Materials Co.

401 N. KIRKMAN ST.

LAKE CHARLES, LA 70601

(337) 433-0681

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