Operations Manual for

Universal Advanced Bio-Reactor System

By *RGF* Environmental Group, Inc

The *RGF* Environmental Group
3875 Fiscal Court
West Palm Beach, Florida 33404
Phone: 1-561-848-1826
Fax: 1-561-848-9454

Contents

Section 1: Overview

Introduction

About *RGF*

Congratulations on the purchase of your new *RGF* Universal Advanced Bio-Reactor water treatment system. For over 25 years *RGF* Environmental Group Inc. has been the industry leader in industrial wash water treatment systems, with thousands of installations worldwide.

RGF Environmental Group is committed to helping industry comply with strict EPA regulations. Founded in 1985, *RGF* pioneered the development of heavy equipment zero discharge wash water recycling systems. Since then, *RGF* has continuously expanded to encompass the entire scope water treatment concerns of industry. Today *RGF* offers a verity of products and services that are among the widest available in the pollution control equipment industry.

How to Use This Manual

As with any piece of new equipment, the first thing you should do is obtain a complete understanding of the operation and maintenance of the system before you begin. The best way to do this is to read the manual and associated documentation sent with the unit well before it is scheduled to be installed. *RGF* has invested a great deal of effort to make our manuals as informative and user friendly as possible to make the task of learning about your new system as enjoyable as possible.

How This Manual Is Organized

This manual is divided into the following major sections.

Shipment Inspection/ Receipt Checklist:

This section should be read immediately upon receipt of your system.

Safety:

A description of the labeling conventions employed in the manual to point out specific items relating to issues of personnel safety and proper operation of the system. General safety concerns and overall operational guidelines for the system.

Chapter 1: The Universal Advanced Bio-Reactor

Unit familiarization, basic system information and system flow diagrams. Covers the overall concepts of the Vision 2000 Ultrasorb System.

Chapter 2: Installation

Provides important information to ensure proper equipment placement and connection.

Chapter 3: System Startup and Operation

Contains the steps required to properly start up your new system. The Operating Instructions outline the normal course of action for the routine operation of the system.

Chapter 4: Preventative Maintenance Schedule

Recommended periodicity's for maintenance routines are located in this section. Personnel who will be maintaining the unit should familiarize themselves fully with this section.

Chapter 5: Controlling Water Quality

Without proper water chemistry control, even the most sophisticated systems will fail to perform to expectations. This section covers important topics which must be continually considered for proper system operation.

Chapter 6: Engineering Drawings

Reference drawings and schematics of the system.

Chapter 7: Troubleshooting

This section provides possible remedies for unusual operating conditions that occur from time to time.

Chapter 8: Replacement Parts List

A convenient source for locating part numbers and nomenclature of commonly replaced items on the system.

Chapter 9: Sub-Component Manuals

Additional literature provided on individual components of the system. This section is useful for more detailed knowledge of technical specifications regarding a specific sub-component.

Sources of Help

If you are unable to answer questions you have about your system from the information in this manual, *RGF* provides the following additional sources of help.

1) Your local ***RGF* licensed distributor**; He has a service support staff who are trained on all systems.

2) ***RGF* Web site Help Page,** provides answers to commonly asked questions and late breaking information concerning system operation and maintenance.

http://www.rgf.**com**

3) If you still have questions or have comments, the ***RGF* Service Department** can be contacted by **e-mail** at:

e-mail: requests@rgf.com

E-mail queries receive first priority through the service department. Please include as much information as possible so our service staff can quickly return an answer.

Section 2: Shipment Inspection

Shipment Inspection

Immediately upon receipt of the **RGF® System**, you are responsible as the purchaser to take the shipping containers off the truck and inspect the equipment, storage tanks, and parts for damage.

IF ANY VISIBLE DAMAGE TO THE EQUIPMENT IS EVIDENT:

- Notify the driver for the courier company **immediately** and write on the Bill of Lading what is damaged or missing.

- Call ***RGF*** immediately at (**800)-842-7771,** (**561)-848-1826 (FL),** or **FAX** (**561**)**-848-9454** a copy of the Bill of Lading with damage or missing items to ***RGF***.

Pre-Installation Checklist

Remove the ***RGF*** **PACKING SLIP** and the **BILL OF LADING.** Verify the condition and presence of all the parts and components found on the pallets and skids. Remove the **LOOSE PARTS CHECKLIST** from inside of the **LOOSE PARTS BOX** and verify the condition and presence of all the parts and components within the box. If any of the items are missing, please contact your distributor immediately or ***RGF*** at (**800)-842-7771,** (**561**)**-848-1826 (FL),** or **FAX** (**561)-848-9454.**

Section 3: Safety

Labeling Conventions in This Manual

Certain information contained in this manual is **VERY IMPORTANT**. In addition, there are varying degrees of importance of this special information. Since most of the special information regards safety related issues, this section explains the conventions used throughout this manual. The following information explains the various conventions used to highlight important information

This statement directly regards an immediate **RISK TO LIFE**.

This designation, along with its associated graphical representation, denotes information that must be completely understood and heeded in order to prevent **Serious Personal Harm or Significant Environmental Consequences**.

This designation brings special attention to information that sensitizes the reader to the importance of following the instruction carefully. Typically used for information that reduces the risk of equipment damage or increases personal safety of the operator.

Note:

This designation clarifies or brings attention to particularly useful information that increases unit performance or reduces operating costs.

General Safety Issues

- All operating procedures, cautions, and warnings MUST be adhered to when operating the **RGF**® system and when using the recycled water processed through the system.

- All OSHA guidelines should be followed and material safety data sheets (MSDS) for all chemicals being used to treat the recycled water should be posted by the owner or operator of the system in a conspicuous place for all persons coming into contact with the system.

- Appropriate personal protective equipment MUST be used by all persons utilizing chemicals when maintaining and operating the system to avoid personal injury.

- Ensure all areas surrounding the system are adequately ventilated.

- Avoid adding excessive chemicals to the recycling system. (Refer to section 6.0, controlling water quality)

Additional safety precautions are listed throughout the manual.

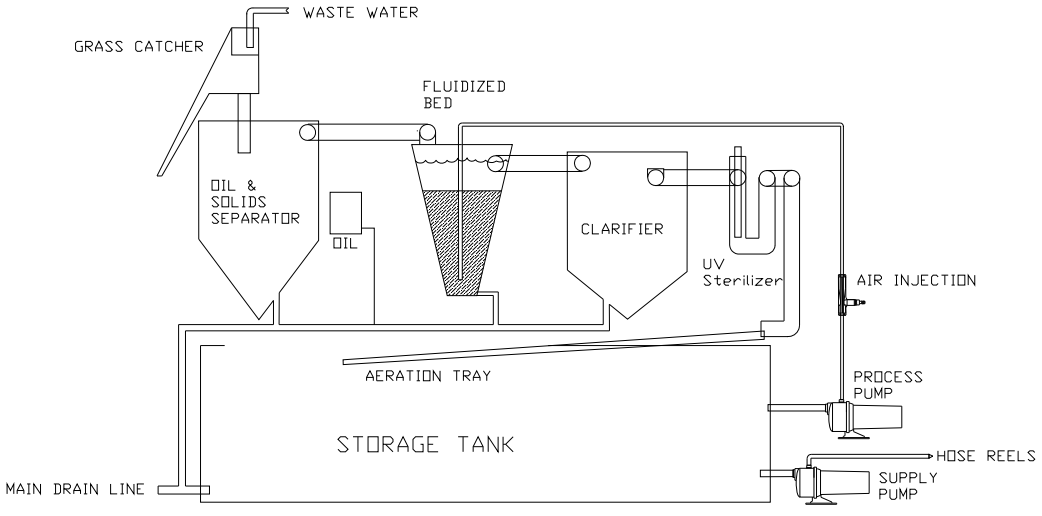
Chapter 1: Universal Advanced Bio-Reactor

The Universal Advanced Bio-Reactor Sytem

The **Universal Advanced Bio-Reactor** is a closed-loop recycle system designed to treat, filter and deliver the cleanest and safest wash water for re-use at your wash bay. The system contains minimal moving parts and replaceable components, low consumables usage and no chemical or microbe addition. The Universal Advanced Bio-Reactor has a small footprint and is totally enclosed for outdoor use and is constructed of all non-corrosive materials. The system utilizes a hand or machine towable grass cart with dump feature.

Unit Familiarization / Flow Diagram

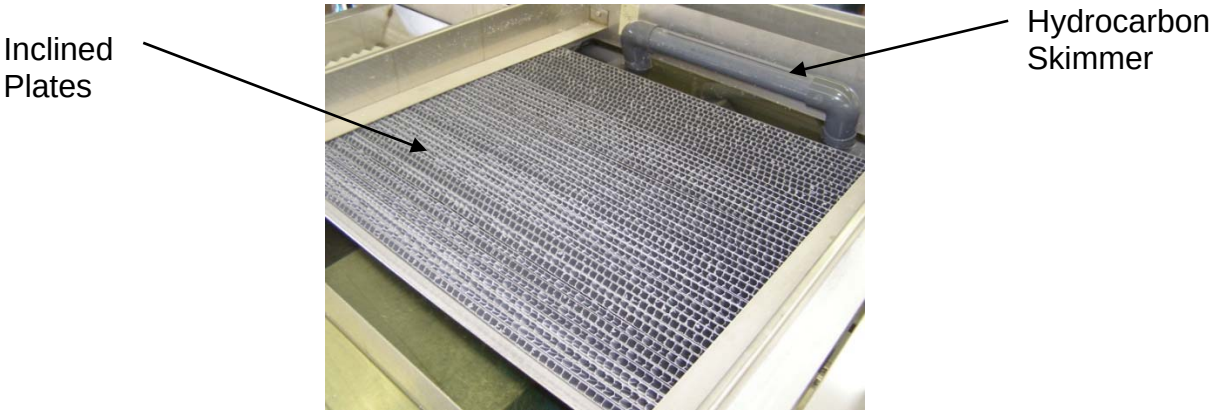
Universal Advanced Bio-Reactor System



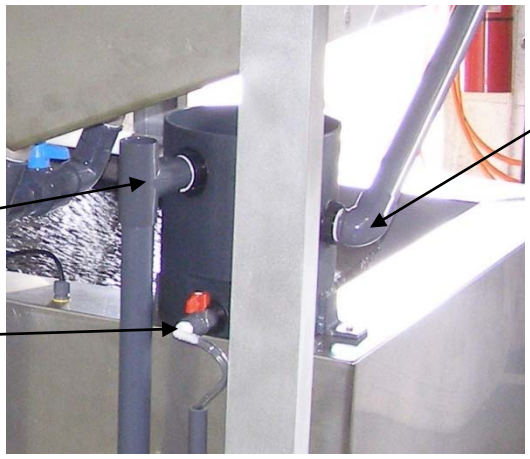
Basic System Components

Grass Separator

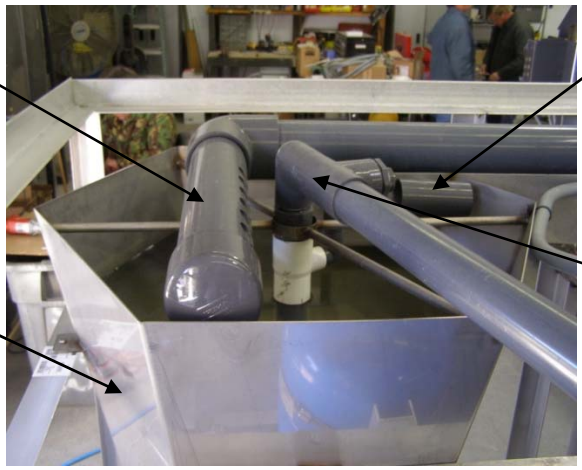
Oil / Water & Solids Separator



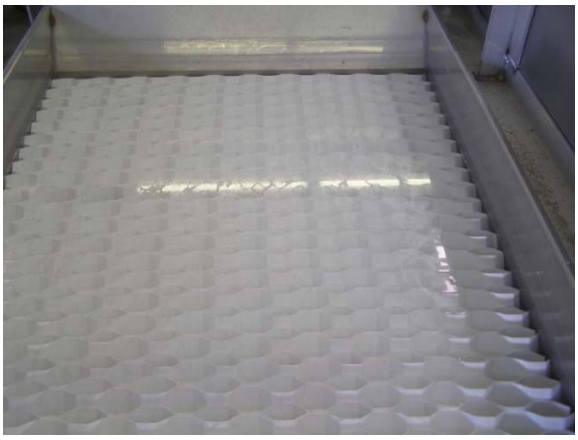
Hydrocarbon Accumulator



Bio-Reactor



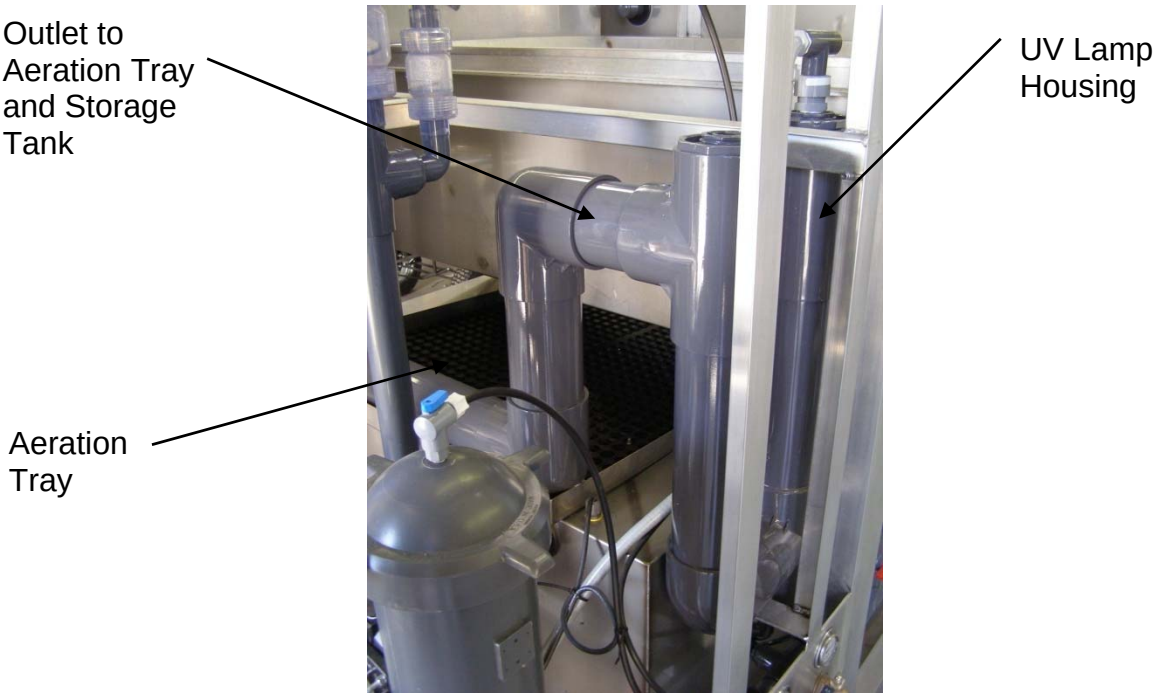
Clarifier



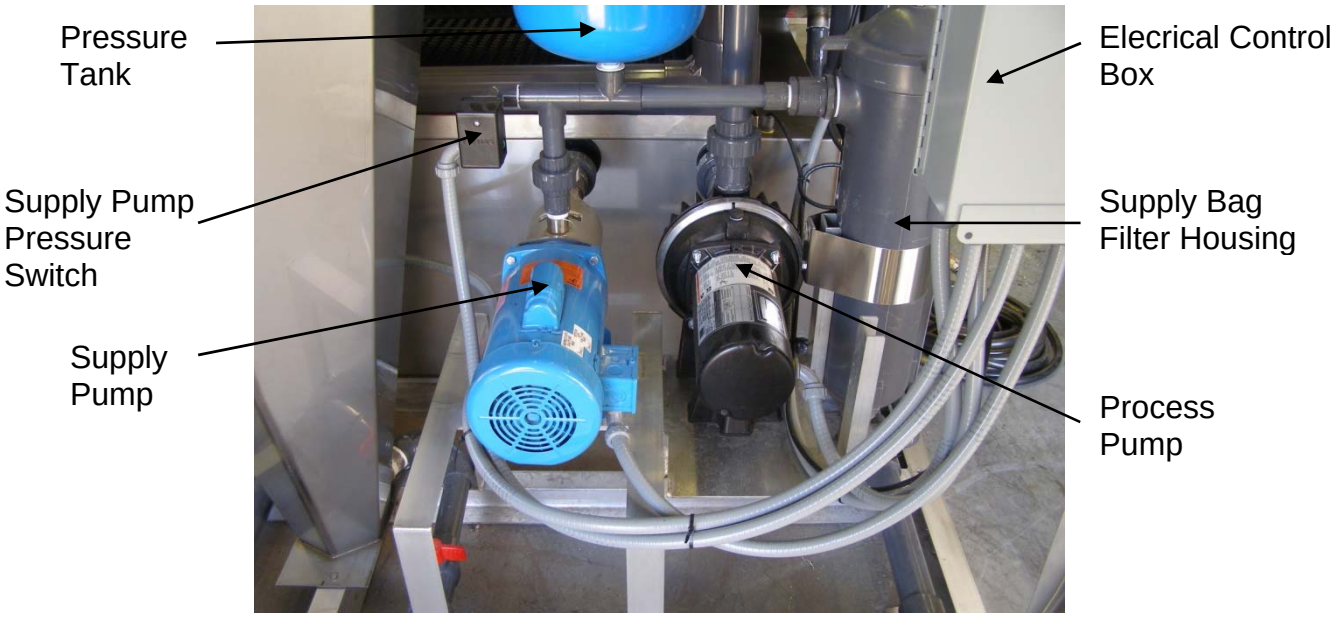
Corrugated PVC Plates

Outlet to UV Sterilizer

Counter Current Advanced Oxidation System

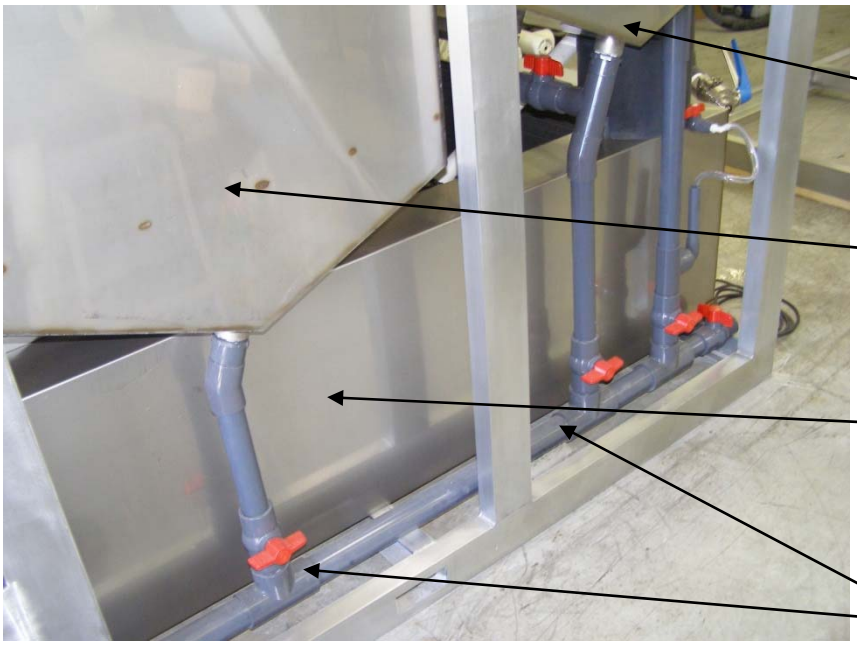


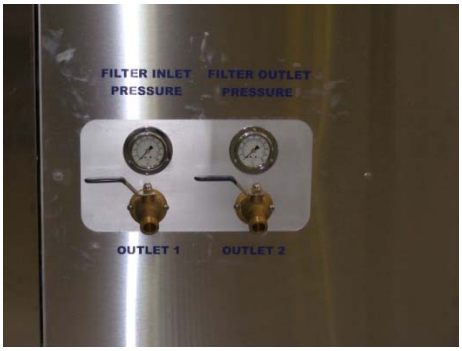
Process and Supply Pumps



UAB – 40 with Dual Supply Pumps

Main Drain Line





UAB-20 HOSE CONNECTION MANIFOLD

UAB-40 HOSE CONNECTION MANIFOLD

UAB-40 FRESH WATER CONNECTION

Chapter 2: Installation

Installation Requirements

The Universal Advanced Bio-Reactor System must be installed in strict compliance with these procedures in order for the warranty to be activated. The purchaser is responsible for bringing the required utilities (i.e. water, electricity, and drainage) to the system and connecting them according to local codes. If the System must be modified by ***RGF*** or the distributor in order to meet the requirements of local codes, the purchaser will be required to pay the modification costs. When the purchaser has completed all of the above, a field representative will be furnished by the ***RGF*** Distributor. He will provide an installation check-out, testing, and training at no charge.

Please read the installation procedure completely and thoroughly before installing and operating the unit.

Installation Procedure

It is important to fully understand Chapter 1 to help to become familiar with all of the components and equipment names of your particular system for installation, start up, operating, and maintenance procedures

NOTE:

Make sure to use Teflon tape or Teflon paste on all threaded connections and PVC glue (medium blue PVC cement) all slip connections.

Equipment Placement

Place Universal Advanced Bio-Reactor on the concrete pad location as desired. Allow a minimum of 2' clearance around the unit for maintenance access.

Main Drain Return Line

A. **MAIN DRAIN RETURN LINE** should be imbedded in the equipment pad prior to system installation. If there is not one available, one should be plumbed above ground to accommodate the drain return line.

B. **THE MAIN DRAIN CONNECTION** is a 2inch female threaded connection located on the back of the unit in the lower left corner.

Main Electrical Connection

A. **MAIN ELECTRICAL JUNCTION** for the particular system components should be planned into the equipment pad prior to system installation. Most installations will require 220 VAC, 20 - 30 amps, 1 phase, 60 Hz with a neutral and a ground as a minimum. 3 Phase option is available on request.

B. The **MAIN ELECTRICAL BOX** is inside the left door panel**.**

C. **Equipment Service Disconnect** should be located within 10' of Equipment.

D. It is required that the Equipment Frame be directly grounded using a typical Grounding Rod System.

Main Fresh Water Connection

A. The **FRESH WATER CONNECTION** is a ¾ in female threaded connector located in the back left panel

Main Waste Water Inlet

A. **MAIN WASTE WATER INLET** pipe should also be imbedded in the equipment pad prior to system installation. If there is not one available, one should be plumbed to accommodate sump pump effluent to the **GRASS SEPARATOR INLET CONNECTION**.

B. The connection is 1 ½ inch PVC pipe.

Chapter 3: System Startup and Operation

System Startup

➢ BEFORE YOU BEGIN

The following startup procedures must be followed thoroughly in order to prevent damage to the system components. Remember:

Do not apply power to the system until directed to do so in the specific startup procedure!

Filling the System

A. Close all **DRAIN VALVES.**

B. Ensure the **BAG FILTER** is installed and the lid is hand tightened.

C. Prime the **PROCESS PUMP** and the **SUPPLY PUMP** by removing the union at the discharge of the pump housing and fill the pump head with water from a hose.

NOTE:

Proper priming of these pumps is of extreme importance. Failure to ensure proper priming will inhibit proper operation of the pump and destroy it.

D. Open all of the purge valves to vent the air from the system as the system fills with water. Close vent valve when air no longer is venting.

E. Fill the **STORAGE TANK** with water until the float is in upright position and floating.

F. Recheck all unions to ensure they are all hand tightened.

G. Fill the **OIL WATER & SOLIDS SEPARATOR, CLARIFIER**, and **BIO-REACTOR TANKS**.

H. Verify **CONTROL POWER**, **PROCESS PUMP** and **SUPPLY PUMP BREAKERS** are in the off position.

Starting the System

A. Apply power to the system by closing the **MAIN POWER DISCONNECT**.

B. Close the **CONTROL POWER BREAKER**.

C. Close the **PROCESS PUMP BREAKER**. Verify the **PROCESS PUMP** starts and water begins to flow to the **BIO-REACTOR FILTER**. Verify the **UV LAMP** is on.

D. Open the **HOSE BIB VALVE** on the front panel.

E. Close the **SUPPLY PUMP BREAKER**, verify **SUPPLY PUMP** starts and water is flowing from the **HOSE BIB VALVE**. The **SUPPLY PUMP** will run until a maintained pressure of approximately 80 psi is reached then the pump will shut-down. If the pump continues to run without stopping, re-priming of the pump may be necessary or check to ensure all of the isolation valves are open.

F. Close the **HOSE BIB VALVE**; verify the **SUPPLY PUMP PRESSURE GAGE** reads between 60 and 80 PSI.

G. Energize the **SUMP PUMP**; allow waste water to flow to the **GRASS SEPARATOR INLET.**

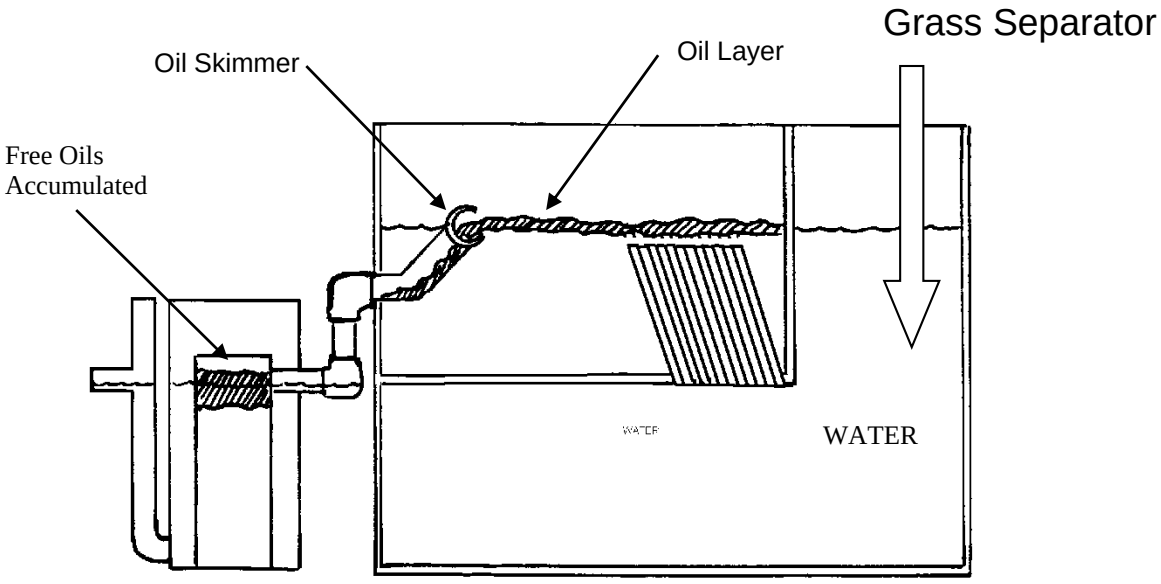
System Operation

Grass Separator

The sump pump delivers wash water to the wastewater inlet connection. The water flowing into the Grass Separator cascades over the grass separator screen removing the grass clippings and large solids from the water. As the grass and solids build up on the screen, gravity causes the solids to slide down the grass separator chute into the Grass Separator Cart.

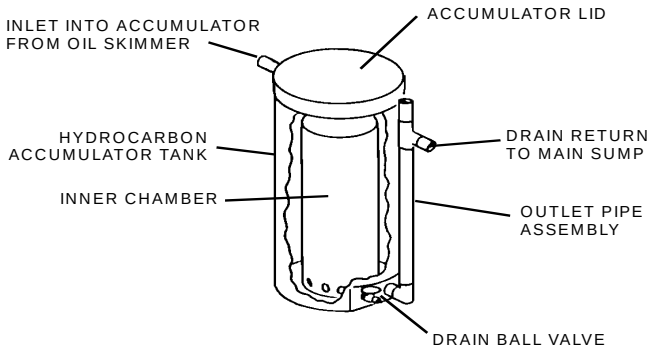
Oil Water Separator

The Oil Water Separator employs the concept of a basic enhanced gravity oil/water separator i.e. a tank vessel that stalls the flow rate to permit gravity to separate oil from water. Oil, having a lower specific gravity than water, will naturally float on water if given time to separate. One of the factors affecting the rise rate of the oil is flow rate or turbulence. To further enhance this process, we use incline plates to drastically reduce the flowrate. There is an Oil Skimmer installed to collect the free oils for collection in the Hydrocarbon Accumulator which is located under the Separator Tank.



Hydrocarbon Accumulator

The free oils which are collected by the Oil Skimmer still contain water mixed in with the oil. The Hydrocarbon Accumulator further separates any remaining oil and water before the water is returned to the main drain return line. When the accumulator starts receiving gross amounts of oil, then it is time to recycle or dispose of the oils collected in the accumulator.



Bio-Reactor Fluidized Bed

Due to its unique shape, the Bio-Reactor Fluidized Bed Filter is an extremely efficient, high capacity biological filter. Beneficial bacteria attach to the media within the Bio-Reactor Fluidized Bed Filter creating a thin film around the sand grains. Water is pumped up through the unit lifting the sand into a fluidized bed. The sand grains are in continual free fall through the water, resulting in an excellent transfer capability between the liquid and the bacterial film on the media. The enormously high surface area combined with this excellent transfer capability creates the perfect habitat for bacterial growth. In addition, the sand grains bump into each other frequently, knocking off excess debris and providing a self cleaning function which allows new areas for bacterial growth.

Counter Current Advanced Oxidation System

The AOUV Chamber is a gravity flow UV contact tube with Ozone injection. A 4” chamber with the UV Lamp mounted through the center of the tube allows reclaim water to surround the lamp and gravity flow past. A counter current flow of Ozonated water coming up through the chamber slows the flow ensuring optimum contact time with UV light and ozone gas.

Operational Notes

WARNING

• UV/O³ CATALYTIC CHAMBER

1) DO NOT look at the UV light in the chamber. PERMANENT DAMAGE OR BURNS TO EYES OR SKIN MAY RESULT.
2) DO NOT run the UV Chamber without water flow through the Chamber; The UV bulb needs water flow to keep it cool. DAMAGE TO THE BULB WILL RESULT.
2) DO NOT open or attempt to repair the chamber. If problems occur, call your serviceman or distributor for further instruction.
3) DO NOT BREATHE OR INHALE THE OZONE GAS. PROLONGED BREATHING OF NOTICEABLE AMOUNTS OF OZONE may result in: respiratory irritation to nasal passages, throat, bronchial and pulmonary membranes; headache, nausea, burning, watery irritated eyes. In some instances (such as enclosed spaces and tanks), significant concentrations of ozone may collect. Adequately vent all tanks and enclosed spaces before entering for maintenance or repair until the level of ozone has depleted down to acceptable levels (<0.1 ppm). If an ozone odor is still noticeable, continue ventilating until the odor is non-detectable. Ozone odor is similar to the smell near copy machines when making copies or Mig and Tig welders in operation and is the "fresh air" odor one sometimes notices after a thunderstorm.

GENERAL NOTE:

At a level of 1 ppm, ozone becomes intolerable to humans. A human's reaction to this level is the same as the reaction to a strong bleach or ammonia odor. Usually, the nose will indicate discomfort.

CAUTION

• BAG FILTER

1) Before servicing be sure to RELIEVE THE PRESSURE on the Bag Filter(s) by using the drain valve and bleed valve or PERSONAL INJURY COULD RESULT!!!
2) *RGF* Filters have been lab tested and time tested - COPY FILTERS HAVE BEEN KNOWN TO BREAK UP OR DISSOLVE, THEREBY PLUGGING OTHER PARTS OF THE UNIT CAUSING EXCESSIVE PRESSURE AND EQUIPMENT DAMAGE!!!

WARNING

- ***SYSTEM SUPPLY PUMP:***

1) Proper priming of the System Supply Pump is essential to the operation of the pump. Improper priming of the pump will cause poor performance and eventual pump failure.
2) DO NOT OPERATE the System Supply Pump if the Storage Tank is emptied or DAMAGE TO THE PUMP WILL RESULT.

CAUTION

- ***PROCESS PUMP:***

1) TO PREVENT DAMAGE TO THE PROCESS PUMP, DO NOT OPERATE without sufficient prime and net positive suction head (NPSH).
2) DO NOT OPERATE THE PUMP while the system valves are closed.

Chapter 4: Preventative Maintenance Schedule

Overview

The following section is developed to keep the **ULTRASORB® System** in top working order. It is **NECESSARY** to follow the maintenance procedures below precisely as stated. The lack of maintenance, in the long run, will reduce productivity and can be both costly and time consuming. It is recommended that this format be copied and incorporated as a regular work routine.

Turn off all power and release pressure before servicing the system. <u>All gauges must read zero</u>!

Required Tools and supplies

- ✓ Hammer
- ✓ Adjustable End Wrench
- ✓ Square Head Shovel For Digging Out Trench Valley
- ✓ Rubber Boots And Gloves
- ✓ Proper Safety Equipment
- ✓ Ph Test Strips
- ✓ #1 Flat Head Screw Driver For Venturi Adjustment If Needed
- ✓ Garbage Bag For Proper Filter Disposal

Daily Maintenance

Universal Advanced Bio-Reactor System

Daily, with the system running, log the pressure gauge readings. Check the water level in the Storage Tank. Keep an accurate record of all of the readings and indicators to determine when certain components of the equipment skid will need maintenance.

Grass Catcher

Daily or as required the Grass Catcher should be emptied and cleaned of debris. The Grass Catcher can be removed by hand or by hitch to disposal site and includes a self dumping mechanism.

Bag Filter Gauges

Bag Filter gauges should be noted daily. If the pressure difference for the Bag Filter is 15 psi or more, the filters need to be removed and cleaned as per Bag Filter Weekly Maintenance instructions.

Supply Pump Discharge Gauge

This gauge indicates the pressure in the Water Supply System. The system should operate at approximately 90 psi. The Supply Sump should shut off at 90 PSI and restart at 70 PSI.

Counter Current Advanced Oxidation System

Ensure the UV/O^3 Catalytic Chamber indicator light on the side of the chambers is illuminated.

Weekly Maintenance

Trenches, Sumps, Pits, and Clarifiers

Weekly, or as required, the trenches, sumps, and pits of the pad need to be checked for sediment level. The trenches' sediment level should not be more than half of the depth of the trench. Dig out the trench using a shovel, and dispose of the waste accordingly. The sumps and pits should be dug out if there is at least 1/4 of the depth full of sediment. The clarifiers should be removed and dug out on a weekly basis, or as required, regardless of the amount of sediment.

IMPORTANT:

Dig out the trenches, sumps, and pits as regularly as possible. Keeping them cleared of sediment build up will result in better water quality throughout the entire system.

Grass Separator

Weekly or as required initiate the Grass Screen Spray to remove accumulated solids from the screen.

A. Turn System Main Power **ON**.

B. **OPEN** Manual Valve (SS-1).

C. Ensure Supply Pump is running, indicated by Supply Pump Discharge Gauge.

D. Allow Screen Spray to run for 2 minutes or as required to remove accumulated debris.

E. **CLOSE** Manual Valve (SS-1).

Bag Filters

Weekly or as required, the Bag Filter should to be removed and manually cleaned by the following procedure:

Manually Cleaning the Bag Filter

A. Turn the Process Pump Control Switch to **OFF.**

B. **OPEN** the Bag Filter Drain Valve (PD-1) and Solids Bleed Valve.

C. Allow to drain and relieve pressure. **The Pressure Gauges Should Read "Zero"**.

D. Disconnect all of the air bleed lines from the lids.

E. Remove the Bag Filter Lids by turning them counterclockwise.

F. Remove and manually clean the Bag Filter using a fresh water hose to flush all debris from the filter and the inside of the filter housings. Replace filters to the housings.

G. Replace the lids by turning clockwise; ensure the filter seals are in place on the housings.

H. Replace all of the air bleed lines to the lids.

I **SHUT** the Polishing Filter drain (PD-1).

J. Turn the Process Pump Control Switch to **ON.**

K. Allow Solids Bleed Valve to purge air and **CLOSE**.

CAUTION

- ***BAG FILTER***

1) Before servicing be sure to RELIEVE THE PRESSURE on the Bag Filter by using the drain valve and bleed valve or PERSONAL INJURY COULD RESULT!!!
2) *RGF* Filters have been lab tested and time tested - COPY FILTERS HAVE BEEN KNOWN TO BREAK UP OR DISSOLVE, THEREBY PLUGGING OTHER PARTS OF THE UNIT CAUSING EXCESSIVE PRESSURE AND EQUIPMENT DAMAGE!!!

Fresh Water Make-Up Timer

Fresh Water Make-Up Timer is set during installation to allow fresh water into the Storage Tank as required after operation hours. If power is taken from the system the Fresh Wate Make-Up Timer will reset, and as such should be checked weekly to ensure fresh water make-up is only initiated after operational hours.

Storage Tank

Open the Drain Valve (STD-1) to the Storage Tank and allow draining for 1 minute to remove any accumulated solids from the bottom of the tank.

Check inside the tank to ensure the float switches are free to swing. Remove any accumulated debris or scum from the surface of the tank water.

Oil Water & Solids Separator Tank

Open the Drain Valve (OSD-1) to the Separator Tank and allow draining for 1 minute to remove any accumulated solids from the bottom of the tank.

Remove any accumulated debris or scum from the surface of the tank water.

Clarifier Tank

Open the Drain Valve (CTD-1) to the Clarifier Tank and allow draining for 1 minute to remove any accumulated solids from the bottom of the tank.

Remove any accumulated debris or scum from the surface of the tank water.

Monthly Maintenance

Oil Water & Solids Separator Tank

Open the Drain Valve (OSD-1) to the Separator Tank and allow tank to fully drain. With fresh water, clean debris and sludge from the Tank Walls, Incline Plates, fittings and fixtures of the Tank. Allow to drain, close Drain Valve (CTD-1)

Clarifier Tank

Remove the central roof panel of the systems outer skin to allow access to the Clarifier Tank. Open the Drain Valve (CLD-1) to the Clarifier Tank and allow the tank to fully drain. With fresh water, clean debris and scum from the Tank Walls, Incline Plates, fittings and fixtures of the tank. Allow to drain, close Drain Valve (CLD-1) and replace roof panel.

As Required Maintenance

Winterizing the System

In areas of the world where the system will be shut down for winter or there is a possibility of local freezing, the system will need to be drained down to prevent damage to the internal components and piping of the system. The water from the system should be hauled off or evaporated. All main sumps to the system should be turned off, pumps removed and covered to prevent damage to the sump basins. All power to the system should be shut off completely. The components of the system should be drained completely (e.g. pumps, filter housings, UV/O_3 Chamber).

It is recommended that Anti-freeze be added to the system prior to draining to prevent any trapped water from freezing. As an alternative, compressed air can be used to remove trapped water from the system.

Chapter 5: Controlling Water Quality

Overview

Controlling the wastewater quality on the **ULTRASORB® System** is a very important process that can greatly enhance the quality of your recycled water. By controlling the pH level, Total Alkalinity, the amount of oxidizers and soaps that are used, you will be able to improve the quality of water in your system. There are many factors which control the water quality. These factors are listed below in order of their appearance in the following section:

pH / Alkalinity

6.1.1 pH

6.1.2 Total Alkalinity

Oxidizers

Oxy-Puck / Hydrogen Peroxide

Ozone

Ultra Violet Light

Cleaning Agents

Enviro-Blaster

Water Conditioner 1 (WC-1)

Solids

Total Dissolved Solids (T.D.S.)

Total Suspended Solids (T.S.S.)

PH / Alkalinity

PH

pH (potential hydrogen) is a relative measure to indicate how acidic or alkaline a substance is. Thus, it denotes the degree or strength of alkaline or acidity. Some acids or alkaline substances are stronger than others and, in order to compare them, the pH scale has been devised. The pH numerical index ranges from 1.0 (extremely acidic) to 14.0 (extremely alkaline). The midpoint of 7.0 indicates that the solution is neutral. That is, it is neither acidic nor alkaline. Pure distilled water is a neutral solution. Note: High pH tends to emulsify oils and reduce the efficiency of the unit, the use of high pH cleaners should be minimized.

The pH scale is a logarithmic scale and even though the difference from 0 to 14.0 doesn't seem very great, every unit on the pH scale is a difference of 10 times, and every two units is a difference of 100. For example, if you have an alkaline cleaning solution of 10.0 and increase it to 11.0, you are making that solution 10 times more alkaline. If you go up two degrees to a pH of 12.0, the solution becomes 100 times more alkaline, and so on.

➢ *Controlling pH:*

To Raise pH:

One chemical usually added to raise the pH level is Sodium Carbonate. How much to add is basically a trial and error operation, but a general rule of thumb that is good to follow is to add 1/4 pounds of Soda Ash for every 1,000 gallons of water within the system. After adding the Soda Ash, wait for about an hour before re-checking the pH level. Take whatever further action is indicated by the test.

To Lower pH:

The chemical normally added to lower the pH level is called Muriatic Acid, which is actually a dilute form of the more hazardous hydrochloric acid and comes in liquid form. Another acid product is the so-called Dry Acid or Sodium Sulfate, which comes in a granular form. **Acid of any type should always be added directly to the water, NEVER the water to the acid! The amount of acid required is determined by performing an acid demand test with the water test kit.**

Total Alkalinity

Total Alkalinity is the measure of the total amount of alkaline chemicals in the water and **not** the same as pH. pH measures the **strength** of an alkaline (or acid), while alkalinity measures the **amount** of alkali's present. While pH and Total Alkalinity are not the same thing, **Total Alkalinity can have an effect on how fast or easily changes in pH can be accomplished**.

➢ *Controlling Alkalinity*

For our purposes, the **Total Alkalinity should be kept at about 150 ppm**. In general, alkalinity has not been a problem for recycling, providing you are using a **neutral soap**. If you have a drum of water and introduce a scoop of alkaline clearer, you may change the pH and get a reading of 12. That does not mean that if you add a second scoop of cleaner, you will get a different reading - in fact, it will probably be identical. What will change is the Total Alkalinity.

Oxidizers

Oxy-Puck - Hydrogen Peroxide

Hydrogen peroxide is an oxidizer that exhibits outstanding purifying characteristics. It is not affected by the pH level and the only by products after oxidation are oxygen and water. Also, the hydrogen peroxide level does not need to be closely controlled. It can have levels ranging from 1 - 10 ppm. It will significantly reduce the amount of B.O.D. (Biological Oxygen Demand) and C.O.D. (Chemical Oxygen Demand) and will also remove any odors that may be present and increase the clarity of the water.

Ozone

Ozone is another oxidizer that exhibits outstanding purifying characteristics. Ozone is different than hydrogen peroxide in that it is not in a liquid form. Ozone is produced by a unique process developed by ***RGF*** in which a special chamber called the **TurboHydrozone®** uses air as it's agent to produce the ozone. A simple look at the blue indicator light on the chamber assures ozone is being produced. The ozonated air is then bubbled inside of the storage tank or is vacuum dragged into the CO^3P System by the Ozone Venturi, which agitates the water thus oxidizing it, which reduces B.O.D.'s and C.O.D.'s, removes odors, and improves water clarity.

UltraViolet Light

UltraViolet (UV) light is the third oxidizer used by ***RGF*** to complete the Catalytic Oxidation Process (CO^3P). UV light is a sterilizer which kills organics by emitting ultraviolet light inside of the UV Catalytic Chamber. This ultraviolet energy is also used to excite the hydrogen peroxide and the ozone that is already in the water to enhance their individual oxidation potentials.

Cleaning Agents

In discharge systems the use of soaps or chemical additives is not recommended. If one must use detergents or additives they should be neutral pH., quick splitting verity and used sparingly. Cleaning Agents are added to open looped recycling water systems to help remove the oils and road film off of the equipment being cleaned. Cleaning agents contain surfactants which help to relieve the surface tension of the water enabling the oils and particles to detach more readily from the equipment being cleaned. Some cleaning agents however, may cause the oils to emulsify which will not allow for easy removal which in turn may end up back on the equipment. In order to prevent this, the cleaning agents in consideration for use with the system should be formulated with low to moderate foaming and limited oil emulsifying

properties while remaining a neutral pH cleaner. ***RGF*** recommends the following two cleaning agents to be used with your system.

Enviro-Blaster

RGF has developed a specially formulated soap for closed-looped recycling systems called **Enviro-Blaster** to use with your system. This soap is a water white blend of biodegradable surfactants containing all of the qualities listed above, plus it helps prevent bacteria and algae growth, inhibit corrosion, it has no dyes, perfumes, or thickeners added, and it helps to flocculate oil accumulation.

Enviro-Blaster can be purchased in a super concentrated form through your distributor or ***RGF*** at 1-**561-848-1826** or **FAX 1-561-848-9454**.

Water Conditioner-1 (WC-1)

Water conditioners are a good addition to a recycling system because they help to maintain good water quality and help in releasing suspended solids. ***RGF*** has available a water conditioner that can do all of this and more, the **Water Conditioner 1 (WC-1)**. This water conditioner has many water quality improving abilities. It aids in the flocculation of suspended solids, reduces B.O.D. and C.O.D. loading, and helps to soften the water. WC-1 also inhibits corrosion on your system, providing more years of service and will help to lower the total suspended solids count, which will improve the color and clarity of your recycled water. Since WC-1 can provide all of these benefits, it should be made a regular part of the chemical additions to your system.

Dissolved and Suspended Solids

Total Dissolved Solids (T.D.S.)

T.D.S. represents the total conductive material actually dissolved in the water (refer to Section 11.0 Addendum's / Training Bulletin - TB 001). It is the same as salt or sugar dissolved in water and should not be confused with suspended solids or turbity. Total dissolved solids can include both organic and inorganic materials. Inorganic materials can be soluble in many cases and add to T.D.S. Any chemical addition to the water will increase T.D.S. (except hydrogen peroxide). Water treatment chemicals often solve one problem but create another problem. While an addition of a flocking agent may remove suspended solids and turbidity, it may drastically increase T.D.S.

Eventually a solution with increasing T.D.S. will reach a level where it is considered to be saturated (i.e. it has reached its solubility constant). Saturation is when the addition of a soluble or dissolved solid reaches the maximum ability of the water to hold it in solution at a given temperature. When the T.D.S. level exceeds this level, the material comes out of solution and either settles or forms crystals, which is how rock candy is made.

T.D.S. is measured by a special conductivity meter which works on the principle that "pure" water has no conductivity of electrical current. The addition of material such as T.D.S. increases the electrical conductivity, therefore; the higher the reading, the higher the T.D.S. level. Readings are in microsiemens - a unit of low electrical current.

Total Suspended Solids (T.S.S.)

T.S.S. represents the total amount of fine colloidal particles floating in a liquid, too small to settle out but, kept in motion by Brownian movement (refer to Section 11.0 Addendum's / Training Bulletins - TB 002). Brownian movement is the rapid vibratory motion of particles suspended in a liquid, caused by the bombardment of the particle by the moving molecules of the liquid. The velocity varies inversely with the size of the particles and also depends on the viscosity of the medium. T.S.S., unlike T.D.S. (Total Dissolved Solids), does not dissolve in water and are deemed important because these solids will create unsightly conditions, sludge deposits, and a demand for oxygen. Suspended solids can be organic or inorganic.

The standard way of testing waste water for suspended solids is to filter the waste water through a 0.45 μm (1 micron = 1 millionth of a meter) porosity filter. Anything on the filter paper after drying at a temperature of approximately 103°C is considered a portion of the suspended solids. Another way to measure suspended solids is by a device called a spectrophotometer. This device is used to measure photo metrically, the quantity of light of a particular wavelength (S.S. = 810 nm) that is absorbed by the suspended solids in solution.

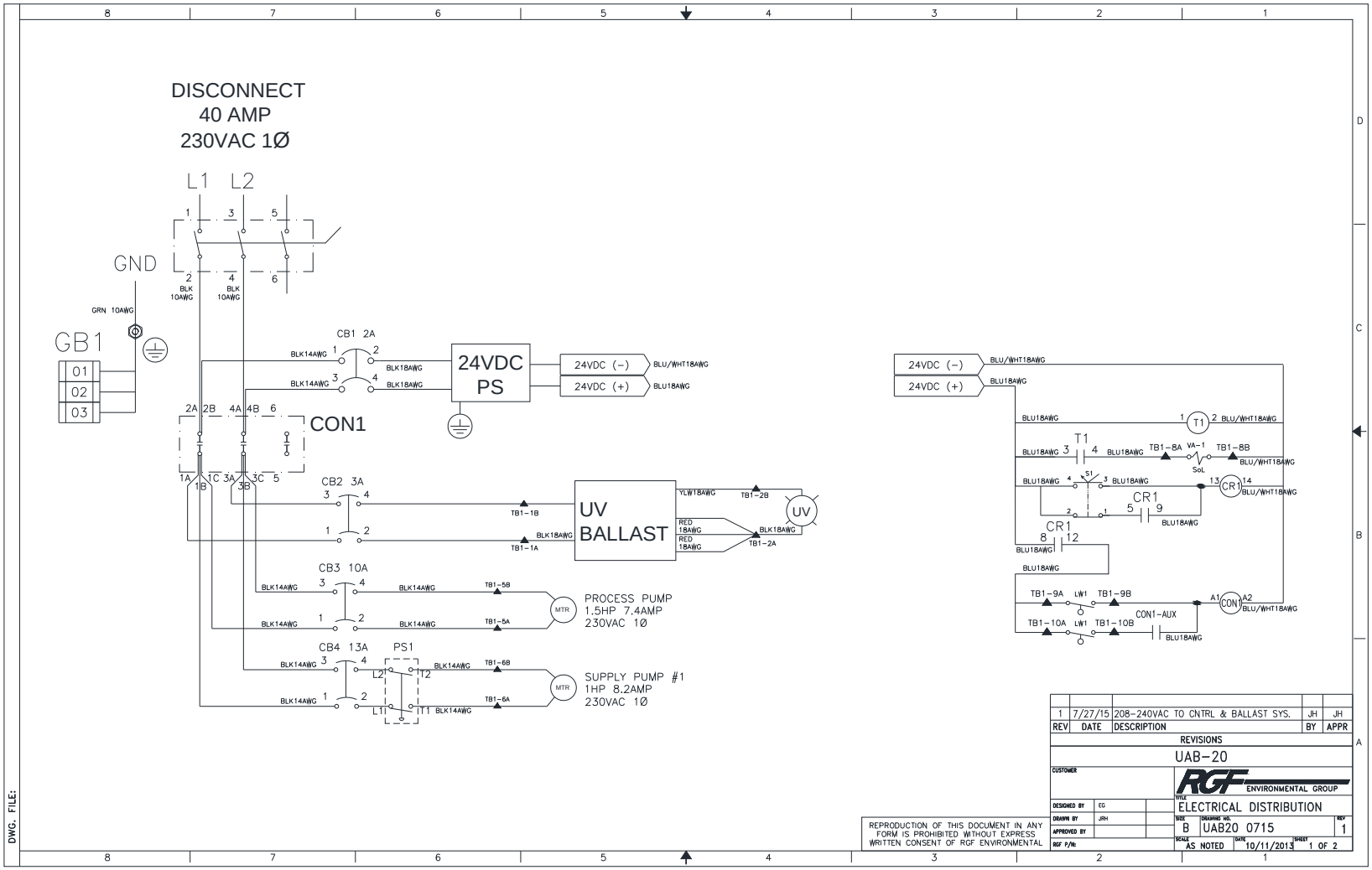
Chapter 6: Engineering Drawings

1) ELECTRICAL DRAWING

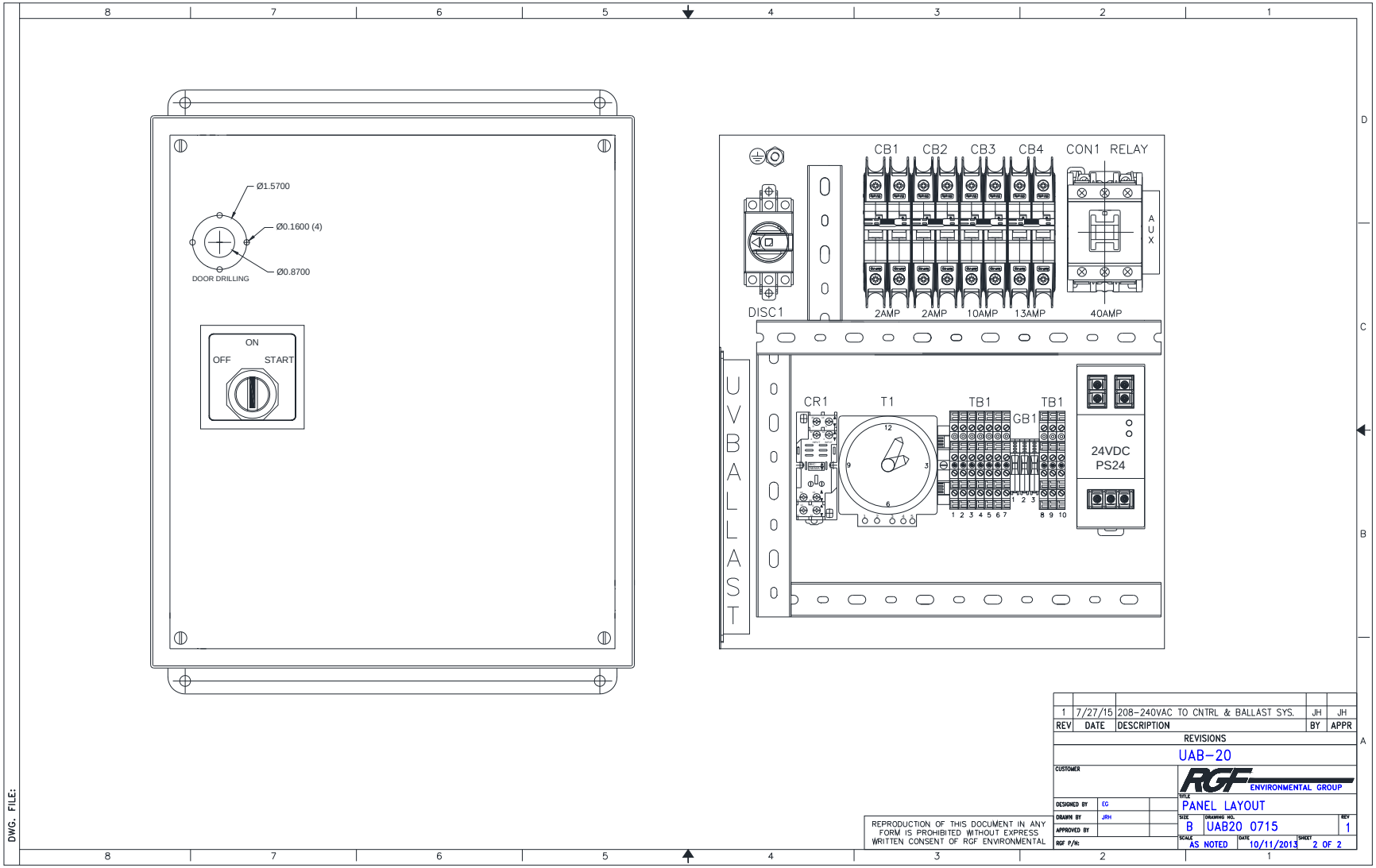
2) ELECTRICAL LAYOUT

3) PIPING & INSTRUMENTATION DRAWING

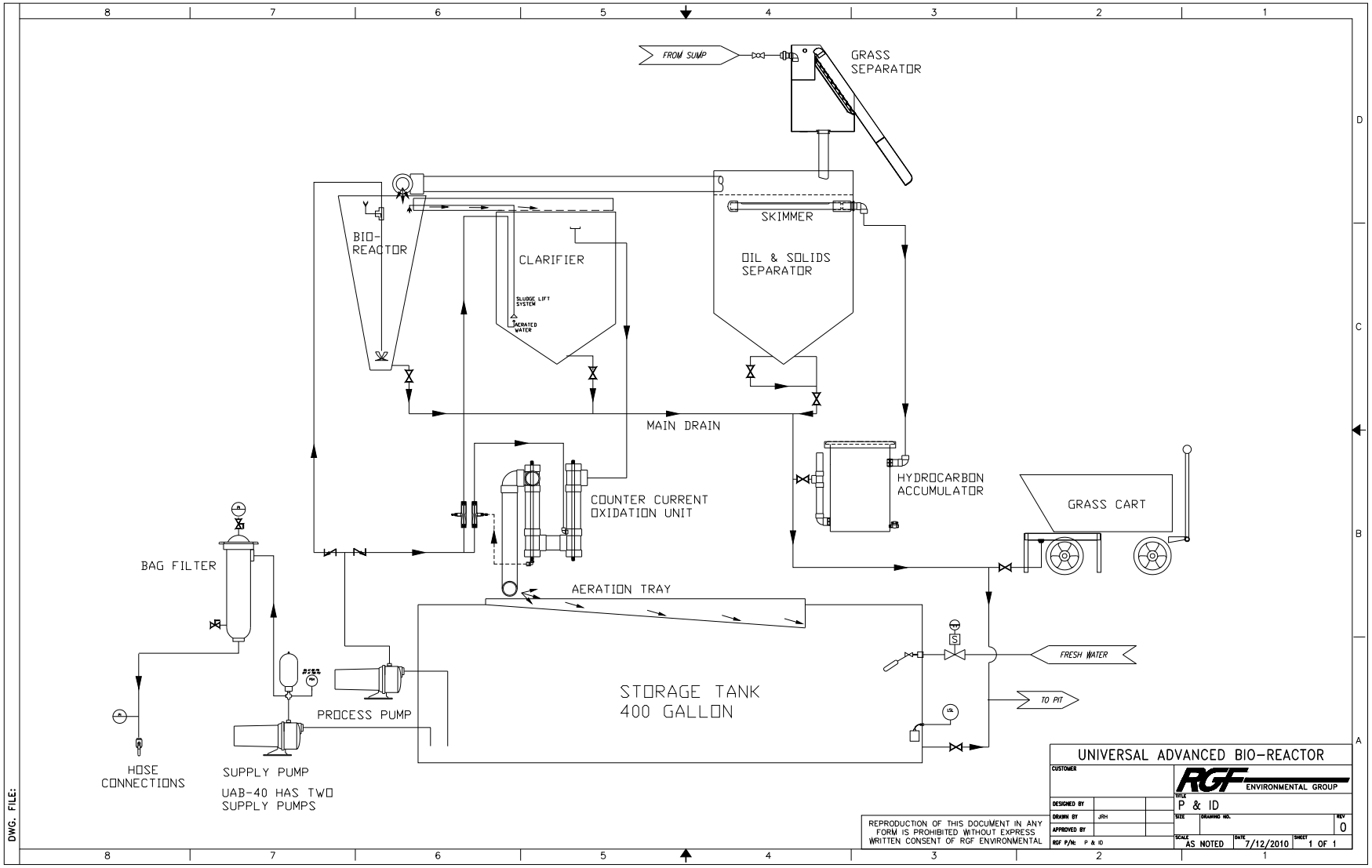
UAB-20 ELECTRICAL



UAB-20 ELECTRICAL LAYOUT



UAB P&ID


FROM SUMP
GRASS SEPARATOR
SKIMMER
BIO-REACTOR
CLARIFIER
SLUDGE LIFT SYSTEM
AERATED WATER
OIL & SOLIDS SEPARATOR
MAIN DRAIN
HYDROCARBON ACCUMULATOR
GRASS CART
COUNTER CURRENT OXIDATION UNIT
BAG FILTER
AERATION TRAY
FRESH WATER
TO PIT
STORAGE TANK 400 GALLON
PROCESS PUMP
HOSE CONNECTIONS
SUPPLY PUMP
UAB-40 HAS TWO SUPPLY PUMPS
UNIVERSAL ADVANCED BIO-REACTOR
CUSTOMER
RGF ENVIRONMENTAL GROUP
DESIGNED BY
DRAWN BY JRH
APPROVED BY
RGF P/N: P & ID
TITLE P & ID
SIZE
DRAWING NO.
REV 0
SCALE AS NOTED
DATE 7/12/2010
SHEET 1 OF 1
REPRODUCTION OF THIS DOCUMENT IN ANY FORM IS PROHIBITED WITHOUT EXPRESS WRITTEN CONSENT OF RGF ENVIRONMENTAL
DWG. FILE:

Chapter 7: Troubleshooting

Flow

SYMPTOM	PROBABLE CAUSE	SOLUTION
PROCESS SYSTEM		
1. PROCESS PUMP NOT OPERATING	A) POWER IS NOT APPLIED TO PUMP	A) VERIFY POWER IS APPLIED; THE SYSTEM BREAKER IS ON. ENSURE FLOAT SWITCHES ARE PROPERLY POSITIONED, UNOBSTRUCTED AND FREE TO SWING AND ADEQUATE WATER IS IN BOTH SUCTION AND DISCHARGE TANKS ENSURE THE PROPER ELECTRICAL CONNECTIONS WERE MADE TO THE SYSTEM. REFER TO THE PROCESS PUMP COMPONENT MANUAL.
	B) PROCESS PUMP HAS LOST PRIME	B) VERIFY SYSTEM LINEUP. ENSURE UNOBSTRUCTED FLOW TO PUMP SUCTION. REPRIME PUMP ENSURING THAT PUMP CASING IS WATER FILLED. OPEN THE PRIMING PLUG AND RE-PRIME PUMP
	C) SYSTEM VALVES ARE IMPROPERLY ALIGNED	C) CONDUCT VALVE LINEUP WITH P&ID
2. NO OR LOW FLOW THROUGH SYSTEM	A) SYSTEM VALVES ARE IMPROPERLY ALIGNED	A) CONDUCT VALVE LINEUP WITH P&ID

COUNTER CURRENT ADVANCED OXIDATION CHAMBER		
1. NO OR LOW FLOW THROUGH SYSTEM	A) SYSTEM VALVES ARE IMPROPERLY ALIGNED	A) CONDUCT VALVE LINEUP WITH P&ID

Electrical

The Ultrasorb System should be installed by a licensed Electrician and should have a properly sized overcurrent protection (i.e. circuit breaker) device installed upstream of the device. Electrical Troubleshooting should be conducted by an electrically trained individual after he has carefully reviewed the electrical drawing in Chapter Six. All indications should be considered: LED illumination, pump rotation, and fluid flow.

SYMPTOM	PROBABLE CAUSE	SOLUTION
PROCESS SYSTEM		
1. NO FLOW OR NO PUMP OPERATION	A) POWER IS NOT APPLIED	A) VERIFY POWER IS APPLIED; THE SYSTEM B) RESET BREAKER IN ELECTRICLA CONTROL PANEL
2. UV/O3 LIGHT NOT OPERATING	A) UV LAMP BURNT OUT B) UV LAMP BALLAST NOT PROVIDING POWER	A) CALL RGF OR YOUR DISTRIBUTOR TO REPLACE UV LAMP B) CHECK ALL WIRE CONNECTIONS WITH MAIN POWER TURNED OFF AND TIGHTEN IF LOOSE. C) REPLACE AS REQUIRED
3. STORAGE TANK WATER LEVEL LOW OR MAKE-UP WATER FLOWING DURING OPERATIONAL HOURS	A) TIMER TRIGGERING MAKE-UP WATER	A) RESET TIMER TO TRIGGER AFTER OPERATING HOURS

Chemistry

SYMPTOM	PROBABLE CAUSE	SOLUTION
CHEMICAL		
1. EFFLUENT RECYCLED WATER SMELLS	A) INADEQUATE OXYPUCK ADDITION B) UV/O3 CHAMBER NOT OPERATING	A) ENSURE OXYPUCKS ARE ADDED TO SYSTEM AS PER PRESCIBED DOSAGE B) SEE ELECTRICAL: UV/O3 CHAMBER NOT OPERATING.
2. EFFLUENT RECYCLED WATER IS VERY CLOUDY	A) INADEQUATE OXYPUCK ADDITION B) UV/O3 CHAMBER NOT OPERATING. C) THE WATER CONDITIONER (WC-1, OPTIONAL) HAS NOT BEEN ADDED OR RESIDUAL LEVEL IS LOW	A) ENSURE OXYPUCKS ARE ADDED TO SYSTEM AS PER PRESCIBED DOSAGE B) SEE ELECTRICAL: UV/O3 CHAMBER NOT OPERATING. D) INCREASE THE WC-1 INJECTION RATE

NOTE:

If repeated attempts to reduce smell or clear up the recycled water fail to improve the water quality, or if the amount of soap needed to clean adequately rise to an unacceptable level. The water has become over burden with dissolved and suspended solids. The system should be drained and the spent water disposed of in accordance with local, state, and federal regulations.

Chapter 8: Replacement Parts

General Ordering Information

When preparing to order replacement parts for your system:

- Have the **Model #** and **Serial #** of the unit ready when trying to order.
- Have the ship to address ready.
- Identify the part needed with the part # and description and call *RGF* or your local distributor to place an order.

Replacement Parts List

The following is a list of commonly needed replacement parts.

PART #	DESCRIPTION

Filters and Parts

FL-130	300 MICRON NYLON FILTER BAG
FL-111	200 MICRON POLY FILTER BAG
FP-046	POLY BAG FILTER BASKET INSERT
FP-51	O-RING FOR POLY FILTER HOUSING

Chemicals

CE-029	OXYPUCK (2 PER BAG)

Pumps and Parts

PU-150	1 HP PROCESS PUMP
PU-149	1-1/2 HP SUPPLY PUMP
PU-149-1	SEAL FOR 1-1/2 HP SUPPLY PUMP
PG-015	PUMP PRESSURE GUAGE

Valves and Unions

VA-06-1	3/4" PVC BALL VALVE
VA-06-4	1 1/2" PVC BALL VALVE
VA-100-220	3/4” SOLENOID VALVE ASSEMBLY (NORMALLY CLOSED)
VA-100-2	3/4” ELECTRIC SOLENOID COIL ONLY (220 VAC)
VA-22	1/2” BRASS FLOAT VALVE WITH FLOAT
PF-253	3/4" PVC UNION
PF-256	1 1/2" PVC UNION
VA-51	1/4" FPT X 3/8" TUBE 90 DEG PVC VALVE

Misc. Parts

EL-047/4T	36” UV/O3 LAMP
EL-045T	277V 50/60Hz BALLAST - WH22
EL-097T	4 PIN LAMP CONNECTOR
EL-772	FLOAT SWITCH SS
PT-117	OZONE VENTURI
HF-009	3/8” POLYETHYLENE TUBING

Chapter 9: Sub-Component Manuals

PROCESS PUMP

STA-RITE®

OWNER'S MANUAL

INSTALLATION AND OPERATING INSTRUCTIONS
REPAIR PARTS LIST

60 CYCLE
CORROSION RESISTANT SELF-PRIMING
CENTRIFUGAL PUMP

MODELS - PD2 SERIES

3/4 HP	1 HP	1-1/2 HP
PD2HD-L	PD2HE-L	PD2HF-L

MODELS - PD SERIES

2 HP	2-1/2 HP
PDHG-L	PDHHG-L

MODEL - PDSS SERIES

1-1/2 HP
PDSSHFT

STA-RITE INDUSTRIES, INC., DELAVAN, WISCONSIN 53115

S156 (Rev. 1/27/06)

READ AND FOLLOW SAFETY INSTRUCTIONS!

This is the safety alert symbol. When you see this symbol on your pump or in this manual, look for one of the following signal words and be alert to the potential for personal injury:

DANGER warns about hazards that **will** cause serious personal injury, death or major property damage if ignored.

WARNING warns about hazards that **can** cause serious personal injury, death or major property damage if ignored.

CAUTION warns about hazards that **will** or **can** cause minor personal injury or property damage if ignored.

The label **NOTICE** indicates special instructions which are important but not related to hazards.

Carefully read and follow all safety instructions in this manual and on pump.

Keep safety labels in good condition. Replace missing or damaged safety labels.

Electrical Safety

⚠ WARNING

Hazardous voltage. Can shock, burn, or cause death.

Ground pump before connecting to power supply.

⚠ Wire motor for correct voltage. See "Electrical" section of this manual and motor nameplate.

⚠ Ground motor before connecting to power supply.

⚠ Meet National Electrical Code, Canadian Electrical Code, and local codes for all wiring.

⚠ Follow wiring instructions in this manual when connecting motor to power lines.

Make workshops childproof; use padlocks and master switches; remove starter keys.

⚠ CAUTION **Do not touch an operating motor.** Modern motors are designed to operate at high temperatures. To avoid burns when servicing pump, allow it to cool for 20 minutes after shut-down before handling.

General Safety

⚠ WARNING

Hazardous pressure! Do not run pump against closed discharge.

Release all pressure on system before working on any component.

Pump is designed as a lawn sprinkler only. To avoid heat built-up, over pressure hazard and possible injury, do not use in a pressure tank (domestic water) system. Do not use as a booster pump; pressurized suction may cause pump body to explode.

Do not allow pump or piping system to freeze. Freezing can damage pump and pipe, may lead to injury from equipment failure and will void warranty.

Pump water only with this pump.

Periodically inspect pump and system components.

Wear safety glasses at all times when working on pumps.

Keep work area clean, uncluttered and properly lighted; store properly all unused tools and equipment.

Keep visitors at a safe distance from the work areas.

Electrical

THE MOTOR IS SET FOR 230 VOLTS WHEN SHIPPED.

To change the motor to use 115 volts:

1. Turn off power
2. Remove the back motor cover.
3. Use a screwdriver or 1/2" wrench and turn the voltage selector dial counterclockwise until 115 shows in the dial opening.
4. Reinstall the motor cover.

Figure 12: Changing the Voltage Setting

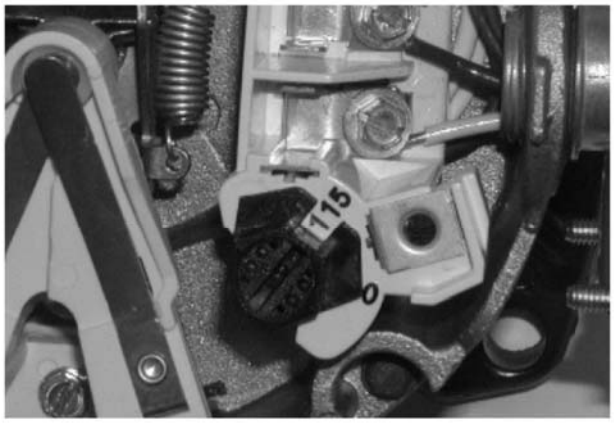


Figure 13: Motor Set for 115 Volt Operation

⚠WARNING Hazardous voltage. Can shock, burn, or cause death. Disconnect power to motor before working on pump or motor. Ground motor before connecting to power supply.

WIRING

⚠ Ground motor before connecting to electrical power supply. Failure to ground motor can cause severe or fatal electrical shock hazard.

⚠ Do not ground to a gas supply line.

⚠ To avoid dangerous or fatal electrical shock, turn OFF power to motor before working on electrical connections.

⚠ Supply voltage must be within ±10% of nameplate voltage. Incorrect voltage can cause fire or damage motor and voids warranty. If in doubt consult a licensed electrician.

⚠ Use wire size specified in Wiring Chart (Page 7). If possible, connect pump to a separate branch circuit with no other appliances on it.

⚠ Wire motor according to diagram on motor nameplate. If nameplate diagram differs from diagrams above, follow nameplate diagram.

1. Install, ground, wire and maintain this pump in accordance with electrical code requirements. Consult your local building inspector for information about codes.
2. Provide a correctly fused disconnect switch for protection while working on motor. Consult local or national electrical codes for switch requirements.
3. Disconnect power before servicing motor or pump. If the disconnect switch is out of sight of pump, lock it open and tag it to prevent unexpected power application.
4. Ground the pump permanently using a wire of the same size as that specified in wiring chart (Page 7). Make ground connection to green grounding terminal under motor canopy marked GRD. or ⏚.

Electrical

5. Connect ground wire to a grounded lead in the service panel or to a metal underground water pipe or well casing at least 10 feet long. Do not connect to plastic pipe or insulated fittings.
6. Protect current carrying and grounding conductors from cuts, grease, heat, oil, and chemicals.
7. Connect current carrying conductors to terminals L1 and L2 under motor canopy. When replacing motor, check wiring diagram on motor nameplate against Figures 12-13. If the motor wiring diagram does not match either diagram in Figures 12-13, follow the diagram on the motor.

IMPORTANT: 115/230 Volt single phase models are shipped from factory with motor wired for 230 volts. If power supply is 115 volts, remove motor canopy and reconnect motor as shown in Figures 12-13. Do not try to run motor as received on 115 volt current.

8. Motor has automatic internal thermal overload protection. If motor has stopped for unknown reasons, thermal overload may restart it unexpectedly, which could cause injury or property damage. Disconnect power before servicing motor.
9. If this procedure or the wiring diagrams are confusing, consult a licensed electrician.

WIRING CHART (Recommended Wire and Fuse Sizes)

Pump Model	HP	Volt	Max. Load Amps	Branch Fuse* Rating* Amps	DISTANCE IN FEET FROM MOTOR TO METER					
					0 - 50	51 - 100	101 - 200	201 - 300	301 - 400	401 - 500
					WIRE SIZE (AWG)					
PDHG-L	2	115/230	24.0/12.0	30/15	10/14	10/14	8/14	6/12	4/10	4/10
PDHHG-L	2-1/2	115/230	26.0/13.0	30/15	10/14	10/14	8/14	6/12	4/10	4/10
PD2HD-L	3/4	115/230	14.8/7.4	20/15	12/14	12/14	8/14	6/14	6/12	4/10
PD2HE-L	1	115/230	14.8/7.4	20/15	12/14	12/14	8/14	6/14	6/12	4/10
PD2HF-L	1-1/2	115/230	19.2/9.6	25/15	10/14	10/14	8/14	6/12	4/10	4/10
PDSSHFT	1-1/2	115/230	18.0/9.0	25/15	10/14	10/14	8/14	6/12	6/12	4/10

(*) Dual element or Fusetron time delay fuses recommended for all motor circuits.

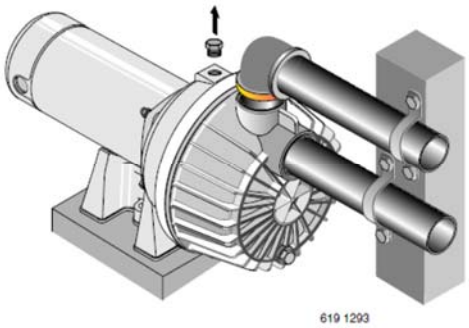


Figure 14 – Remove Priming Plug

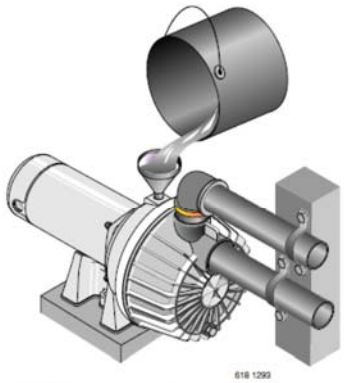


Figure 15 – Fill Pump Before Starting

Drawings are for PDSS, PD, and PD2 Series pumps. PD2 Series is shown.

Figure 16 – Run Ten Minutes or Less

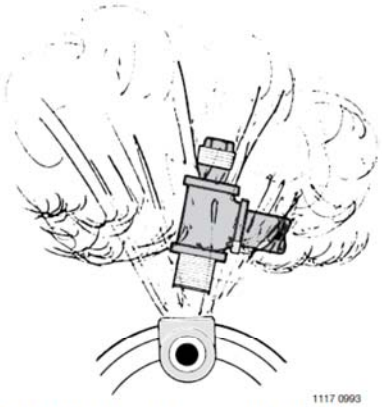


Figure 17 – Do Not Run Pump with Discharge Shut-off.

PRIMING THE PUMP

NOTICE: 'Priming' refers to the pump expelling all air in the system and beginning to move water from its source out into the system. It does not refer only to pouring water into the pump (although pouring water in is usually the first step).

NOTICE: NEVER run pump dry. Running pump without water in it will damage seals and can melt impeller and diffuser. To prevent damage, **fill pump with water before starting.**

1. Remove priming plug (Figure 14).
2. Make sure suction and discharge valves and any hoses on discharge side of pump are open.
3. Fill pump and suction pipe with water.
4. Replace priming plug, using Teflon tape on thread; tighten plug.

   NOTICE: If a priming tee and plug have been provided for a long horizontal run, be sure to fill suction pipe through this tee and replace plug. (Don't forget to Teflon tape the plug.)
5. Start pump: water should be produced in 10 minutes or less, the time depending on depth to water (not more than 20') and length of horizontal run (10' of horizontal suction pipe = 1' of vertical lift due to friction losses in the pipe).

   If no water is produced within 10 minutes, stop pump, release all pressure, remove priming plug, refill and try again.

⚠WARNING Hazardous pressure and risk of explosion and scalding. If pump is run continuously at no flow (that is, with discharge shut off or without priming), water may boil in pump and piping system. Under steam pressure, pipes may rupture, blow off of fittings or blow out of pump ports and scald anyone near.

To prevent explosion, do the following:

A. Be sure discharge (valve, pistol grip hose nozzle, etc.) is open whenever pump is running.

B. If pump fails to produce water when attempting to prime, release all pressure, drain pump and refill with cold water after every two attempts.

C. When priming, monitor pump and piping temperature. If pump or piping begin to feel warm to the touch, shut off pump and allow system to cool off. Release all pressure in system and refill pump and piping with cold water.

Drawings are for PDSS, PD, and PD2 Series pumps. PD2 Series is shown.

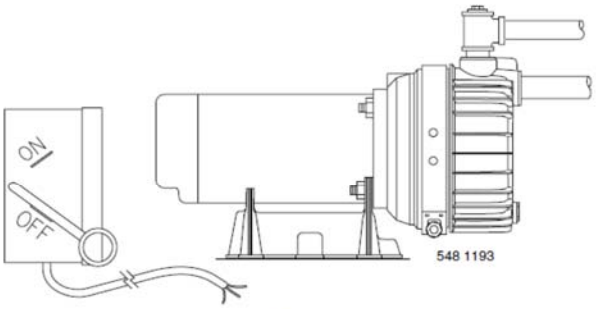


Figure 18 – Disconnect Power

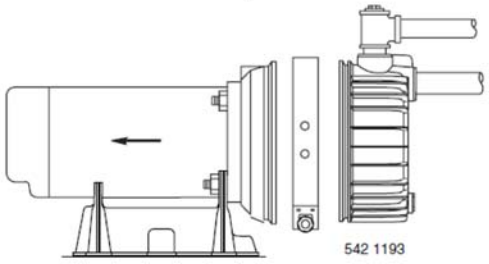


Figure 19 – Slide Motor Back

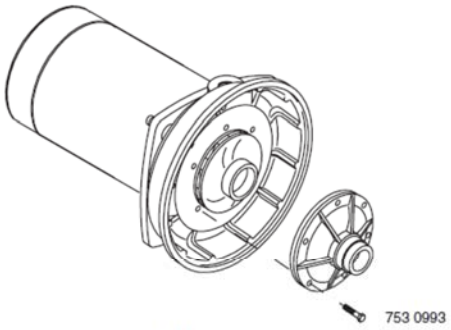


Figure 20 – Remove Diffuser

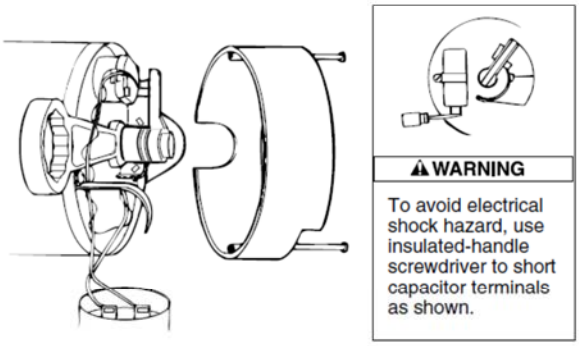


Figure 21 – Hold Shaft

MAINTENANCE

Pump and piping need not be disconnected to repair or replace motor or seal (see Figure 19). If motor is replaced, replace the shaft seal. Keep one on hand for future use.

Be sure to prime pump before starting.

NOTICE: Check motor label for lubrication instructions. The mechanical shaft seal in the pump is water lubricated and self-adjusting.

NOTICE: Drain pump when disconnecting from service or when it might freeze.

PUMP DISASSEMBLY

1. Disconnect power to motor.

   NOTICE: Mark wires for correct assembly.

2. Remove clamp (see Figure 19).
3. Remove pump base mounting bolts. Motor assembly and back half of pump can now be pulled away from pump front half (Figure 19). CAREFULLY remove O-ring.

CLEANING/REPLACING IMPELLER

NOTICE: First, follow instructions under "Pump Disassembly".

1. Remove four screws fastening diffuser to seal plate; remove diffuser (see Figure 20). Exposed impeller can now be cleaned.
2. If impeller must be replaced, loosen two machine screws and remove motor canopy (see Figure 21).
3. ⚠WARNING **Capacitor voltage may be hazardous.** To discharge capacitor, hold insulated handle screwdriver **BY THE HANDLE** and short capacitor terminals together (see Figure 21). Do not touch metal screwdriver blade or capacitor terminals. If in doubt, consult a qualified electrician.
4. Unscrew capacitor clamp and remove capacitor. Do not disconnect capacitor wires to motor.
5. Slide 7/16" open end wrench in behind spring loaded switch on motor end of shaft; hold motor shaft with wrench on shaft flats and unscrew impeller by turning counterclockwise when looking into eye of impeller.
6. To reinstall, reverse steps 1 through 5.
7. See directions under "Pump Reassembly," Page 11.

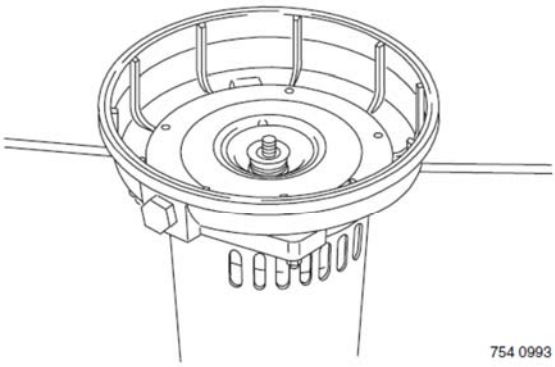


Figure 22 – Remove Seal plate

Figure 23 – Tap Out Seal

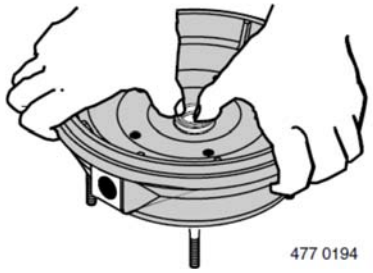


Figure 24 – Press in New Seal

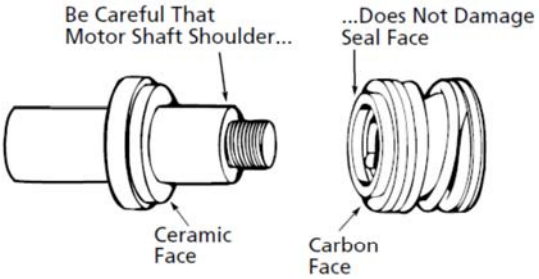


Figure 25 – Protect Seal Faces

REMOVING OLD SEAL

1. Follow instructions under "Pump Disassembly".
2. Follow steps 2 through 5 under "Cleaning/Replacing Impeller".
3. Unscrew four nuts holding pump back half to motor. Remove rotating half of seal by placing two screwdrivers under back half of pump body and **carefully** prying up (Figure 22). Back half of pump body will slide off shaft, bringing seal with it.

   NOTICE: Be sure you do not scratch or mar shaft; if shaft is marred, it must be dressed smooth with fine emery or crocus cloth before installing new seal. DO NOT reduce shaft diameter!
4. Place pump body half face down on flat surface and tap out stationary half of seal (see Figure 23).

INSTALLING NEW SEAL

1. Clean seal cavity in seal plate.
2. Wet outer edge of Rubber Cup on ceramic seat with liquid soap. Be sparing!
3. Put clean cardboard washer on seal face. With thumb pressure, press ceramic seal half firmly and squarely into seal cavity (See Figure 24). Polished face of ceramic seat is up. If seal will not seat correctly, remove, placing seal **face up** on bench. Reclean cavity. Seal should now seat correctly.
4. If seal does not seat correctly after recleaning cavity, place a cardboard washer over polished seal face and **carefully** press into place using a piece of standard 3/4" pipe as a press.
   NOTICE: Be sure you do not scratch seal face.
5. Dispose of cardboard washer and recheck seal face to be sure it is free of dirt, foreign particles, scratches and grease.
6. Inspect shaft to be sure it is free of nicks and scratches.
7. Reassemble pump body half to motor flange. **BE SURE** it is right side up.
8. Apply liquid soap sparingly (one drop is sufficient) to inside diameter of rotating seal member.
9. Slide rotating seal member (carbon face first) onto shaft until rubber drive ring hits shaft shoulder.

NOTICE: Be sure not to nick or scratch carbon face of seal when passing it over threaded shaft end or shaft shoulder. The carbon surface must remain clean or short seal life will result.

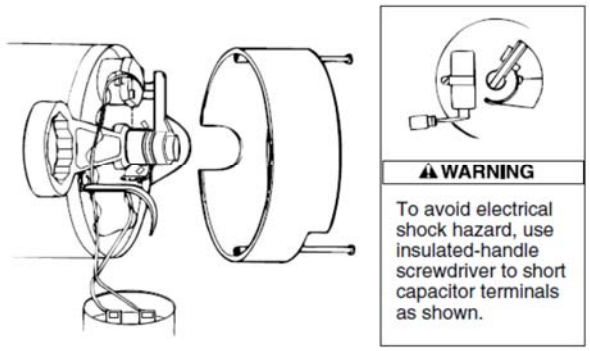


Figure 26 – Hold Shaft

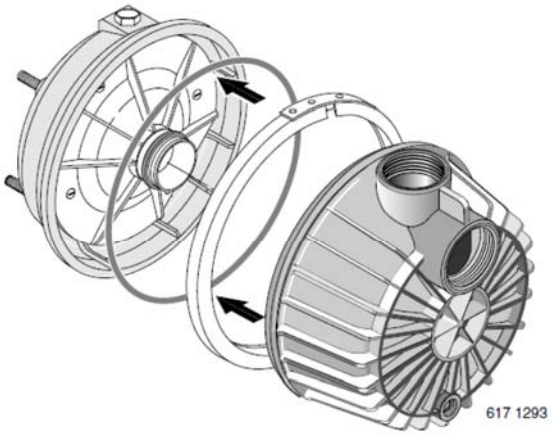


Figure 27 – Assemble Pump

10. Hold motor shaft with 7/16" open end wrench on shaft flats and screw impeller onto shaft. **Be sure you do not touch capacitor terminals with body or any metal object.** Tightening impeller will automatically locate seal in correct position.
11. Remount diffuser on pump body half with five screws.
12. Follow instructions under "Pump Reassembly".

Drawings are for PDSS, PD, and PD2 Series pumps. PD2 Series is shown.

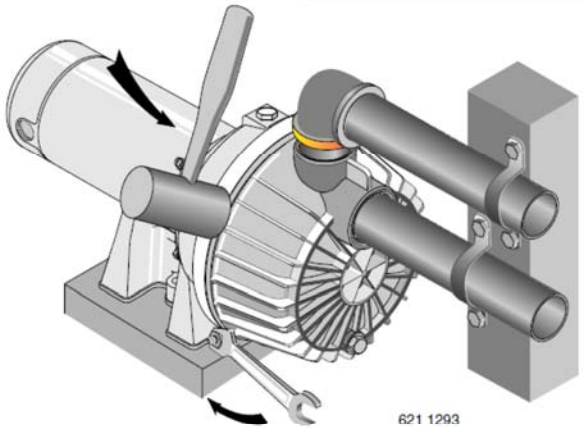


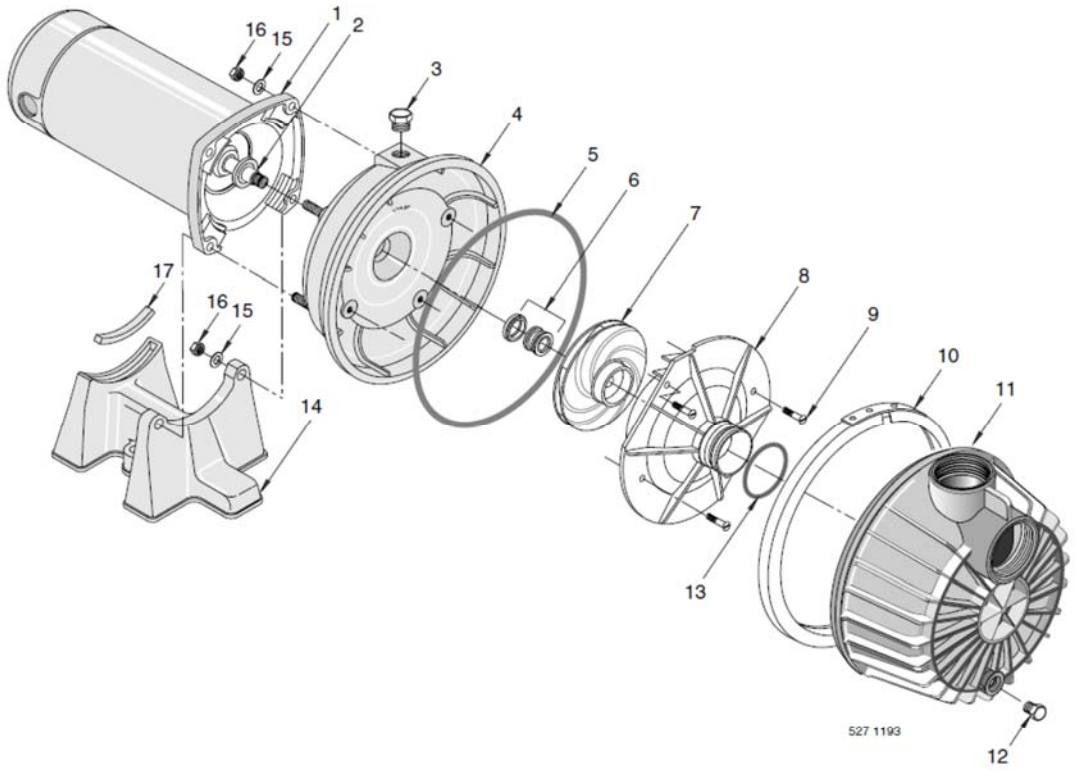
Figure 28 – Tap Clamp While Tightening

PUMP REASSEMBLY

1. Clean O-ring and O-ring groove.
2. Put O-ring in groove on face of flange; put pump halves together (see Figure 27).
3. **BE SURE** inside of clamp is clean. Place clamp on pump halves; snug up. Alternately tighten screw and tap clamp with mallet to seat O-ring (see Figure 28).
4. Replace base mounting bolts.
5. Replace pressure switch tubing and motor wiring; close draincock.
6. Prime pump according to instructions. See "Operation."
7. Check for leaks.

CORROSION RESISTANT CENTRIFUGAL PUMPS

MODELS PD2HD-L, PD2HE-L, PD2HF-L, and PDSSHFT



Key No.	Part Description	PD2HD-L 115/230V 60 Hz/1 Ph 3/4 HP	PD2HE-L 115/230V 60 Hz/1 Ph 1 HP	PD2HF-L 115/230V 60 Hz/1 Ph 1-1/2 HP	PDSSHFT 115/230V 60 Hz/1 Ph 1-1/2 HP
1	Motor*	J218-596PKG	J218-596PKG	J218-601PKG	A100FL-T
2	Slinger	17351-0009	17351-0009	17351-0009	17351-0009
3	Priming Plug	WC78-39T	WC78-39T	WC78-39T	WC78-39T
4	Tank Body Back Half (Complete)	L176-47P1	L176-47P1	L176-47P1	L176-47P2SS
5	O Ring	U9-399	U9-399	U9-399	U9-399
6	Shaft Seal for 5/8" Shaft	U109-6A	U109-6A	U109-6A	U109-6A
7	Impeller	C105-92PVC	C105-92PVB	C105-92PBBB	C105-92PBS
8	Diffuser	C1-258PC	C1-258PCA	C1-258PCA	C1-258PCAEB
9	Screw - #8 - 32 RH	U30-869SS(4)	U30-869SS (4)	U30-869SS (4)	U30-869SS (4)
•	#8 Lockwasher	U43-21SS(4)	U43-21SS(4)	U43-21SS(4)	U43-21SS(4)
10	"V" Clamp	C19-54SS	C19-54SS	C19-54SS	C19-54SS
11	Tank Body Front Half (Complete)	C176-66P	C176-66P	C176-66P	C176-66P
12	Drain Plug - 1/4 NPT	WC78-40T	WC78-40T	WC78-40T	WC78-40T
13	O Ring	U9-226	U9-226	U9-226	U9-226
14	Base	C4-42P	C4-42P	C4-42P	C4-41P
15	Washer - 5/16	U43-11ZP(4)	U43-11ZP(4)	U43-11ZP(4)	U43-11SS(4)
16	Nut - 5/16 - 18	U36-37ZP(4)	U36-37ZP(4)	U36-37ZP(4)	U36-37SS(4)
17	Rubber Pad	C35-11	C35-11	C35-11	C35-15
•	Owner's Manual	S156	S156	S156	S156

• Not illustrated.

* Model PDSSHFT uses TEFC motor.

NOTE: Quantity is one unless otherwise noted ( ).

Troubleshooting Chart

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Motor will not run	Disconnect switch is off	Be sure switch is on
	Fuse is blown	Replace fuse
	Starting switch is defective	Replace starting switch
	Wires at motor are loose, disconnected, or wired incorrectly	Refer to instructions on wiring. Check and tighten all wiring. **⚠WARNING Capacitor voltage may be hazardous. To discharge capacitor, hold insulated handle screwdriver BY THE HANDLE and short capacitor terminals together. Do not touch metal screwdriver blade or capacitor terminals. If in doubt, consult a qualified electrician.**
Motor runs hot and overload kicks off	Motor is wired incorrectly	Refer to instructions on wiring
	Voltage is too low	Check with power company. Install heavier wiring if wire size is too small (See Electrical, Page 6)
Motor runs but no water is delivered *(Note: Check prime before looking for other causes. Unscrew priming plug and see if there is water in priming hole.)	*Pump in new installation did not pick up prime through: 1. Improper priming 2. Air leaks 3. Leaking foot valve	In new installation: 1. Re-prime according to instructions 2. Check all connections on suction line 3. Replace foot valve
	*Pump has lost prime through: 1. Air leaks 2. Water level below suction of pump	In installation already in use: 1. Check all connections on suction line and shaft seal 2. Lower suction line into water and re-prime. If receding water level in well exceeds suction lift, a deep well pump is needed
	Impeller is plugged	Clean impeller; see Maintenance
	Check valve or foot valve is stuck in closed position	Replace check valve or foot valve
	Pipes are frozen	Thaw pipes. Bury pipes below frost line. Heat pit or pump house.
	Foot valve and/or strainer are buried in sand or mud	Raise foot valve and/or strainer above well bottom
Pump does not deliver water to full capacity (Also check point 3 immediately above)	Water level in well is lower than estimated	A deep well jet pump may be needed (over 20 ft. to water)
	Steel piping (if used) is corroded or limed, causing excess friction	Replace with plastic pipe where possible, otherwise with new steel pipe
	Offset piping is too small in size	Use larger offset piping
Pump leaks around clamp	Clamp loose	STOP PUMP, tighten clamp nut 1-2 turns. Alternately tighten and tap on clamp with mallet to seat O-Ring. Do not overtighten.

LIMITED WARRANTY

Sta-Rite Industries warrants to the original consumer of the products listed below, that they will be free from defects in material and workmanship for the Warranty Period from the date of original installation or manufacture as noted.

Product	Warranty Period
Water Systems Products – jet pumps, small centrifugal pumps, submersible pumps and related accessories	*whichever occurs first:* 1 year from date of original installation, or 2 years from date of manufacture
Hydro-Flow Filters	1 year from date of purchase
Signature 2000 Fibrewound Tanks	5 years from date of original installation
Pro-Source Steel Pressure Tanks	5 years from date of original installation
Pro-Source Epoxy-Line Tanks	3 years from date of original installation
Sump/Sewage/Effluent Products	1 year from date of original installation, or 2 years from date of manufacture

Our warranty will not apply to any product that has been subject to negligence, misapplication, improper installation or maintenance. In the event a three phase submersible motor is operated with single phase power through a phase converter, or if three-leg ambient compensated, extra-quick trip overload relays of recommended size are not used, our warranty is void.

Buyer's only remedy and Sta-Rite Industries' only duty is to repair or replace defective products (at Sta-Rite Industries' choice). Buyer agrees to pay all labor and shipping charges associated with this warranty and to request warranty service through the installing dealer as soon as a problem is discovered. If warranty service is requested more than 30 days after the Warranty Period has ended, it will not be honored.

STA-RITE INDUSTRIES SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, OR CONTINGENT DAMAGES WHATSOEVER.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES. IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL NOT EXTEND BEYOND THE WARRANTY PERIOD PROVIDED HEREIN.

Certain states do not permit the exclusion or limitation of incidental or consequential damages or the placing of limitations on the duration of an implied warranty, therefore, the limitations or exclusions herein may not apply. This warranty sets forth specific legal rights and obligations, however, additional rights may exist, which may vary from state to state.

Supersedes all previous publications.

Sta-Rite Industries, 293 Wright St., Delavan, WI 53115

SUPPLY PUMP

ITT

Commercial Water

Goulds Pumps

G&L SERIES

MODEL HMS

Installation, Operation and Maintenance Instructions

GOULDS PUMPS

Goulds Pumps is a brand of ITT Corporation.

www.goulds.com

Description and Specifications

The Model HMS is a close coupled, end suction, multi-stage centrifugal pump for general liquid transfer service, booster applications, etc. Liquid-end construction is all AISI Type 316 stainless steel, stamped and welded. Impellers are fully enclosed, non-trimmable to intermediate diameters. Casings are fitted with diffusers for efficiency and for negligible radial shaft loading.

All units have NEMA 48Y or 56Y motors with square flange mounting and threaded shaft extension.

1. Important Instructions

1.1 Inspect unit for damage. Report any damage to carrier/dealer immediately.

1.2 Electrical supply must be a separate branch circuit with fuses or circuit breakers, wire sizes, etc., in compliance with National and Local electrical codes. Install an all-leg disconnect switch near pump.

CAUTION: ALWAYS DISCONNECT ELECTRICAL POWER WHEN HANDLING PUMP OR CONTROLS.

1.3 Motors must be wired for proper voltage. Motor wiring diagram is on motor nameplate. Wire size must limit maximum voltage drop to 10% of nameplate voltage at motor terminals, or motor life and pump performance will be lowered.

1.4 Always use horsepower-rated switches, contactor and starters.

1.5 Motor protection

1.5.1 Single-phase: Thermal protection for single-phase units is sometimes built in (check nameplate). If no built-in protection is provided, use a contactor with a proper load. Fusing is permissible.

1.5.2 Three-phase: Provide three-leg protection with properly sized magnetic starter and thermal overloads.

1.6 Maximum Operating Limits:

Liquid Temperature:	230°F (110°C)
Working Pressure to:	125 PSI (8 Bar)
Starts per Hour:	20, evenly distributed

1.7 Regular inspection and maintenance will increase service life. Base schedule on operating time. Refer to Section 8.

2. Installation

2.1 Locate pump as near liquid source as possible (below) level of liquid for automatic operation).

2.2 Protect from freezing or flooding.

2.3 Allow adequate space for servicing and ventilation.

2.4 All piping must be supported independently of the pump, and must "line-up" naturally.

CAUTION: NEVER DRAW PIPING INTO PLACE BY FORCING THE PUMP SUCTION AND DISCHARGE CONNECTIONS.

2.5 Avoid unnecessary fittings. Select sizes to keep friction losses to a minimum.

2.6 Units may be installed horizontally, inclined or vertically.

CAUTION: DO NOT INSTALL WITH MOTOR BELOW PUMP. ANY LEAKAGE OR CONDENSATION WILL AFFECT THE MOTOR.

2.7 Foundation must be flat and substantial to eliminate strain when tightening bolts. Use rubber mounts to minimize noise and vibration.

2.8 Tighten motor hold-down bolts before connecting piping to pump.

3. Suction Piping

3.1 Low static suction lift and short, direct, suction piping is desired. Consult pump performance curve for *Net Positive Suction Head Required.*

3.2 Suction pipe must be at least as large as the suction connection of the pump. Smaller size will degrade performance.

3.3 If larger pipe is required, an eccentric pipe reducer (with straight side up) must be installed at the pump.

3.4 Installation with pump below source of supply:

3.4.1 Install full flow isolation valve in piping for inspection and maintenance.

CAUTION: DO NOT USE SUCTION ISOLATION VALVE TO THROTTLE PUMP.

3.5 Installation with pump above source of supply:

3.5.1 Avoid air pockets. No part of piping should be higher than pump suction connection. Slope piping upward from liquid source.

3.5.2 All joints must be airtight.

3.5.3 Foot valve to be used only if necessary for priming, or to hold prime on intermittent service.

3.5.4 Suction strainer open area must be at least triple the pipe area.

3.6 Size of inlet from liquid source, and minimum submergence over inlet, must be sufficient to prevent air entering pump through vortexing. See Figures 1-4.

3.7 Use 3-4 wraps of Teflon tape to seal threaded connections.

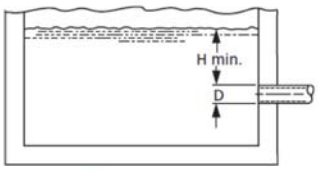


Figure 1

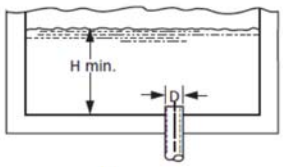


Figure 2

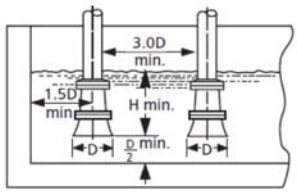


Figure 3

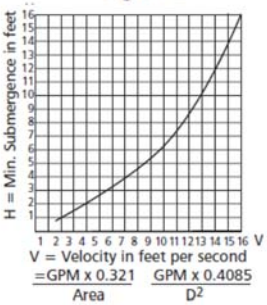


Figure 4

4. Discharge Piping

4.1 Allowance should be made for disconnecting discharge piping near casing to allow for pump disassembly.

4.2 Arrangement must include a check valve located between a gate valve and the pump. The gate valve is for regulation of capacity, or for inspection of the pump or check valve.

4.3 If an increaser is required, place between check valve and pump.

4.4 Use 3-4 wraps of Teflon tape to seal threaded connections.

5. Rotation

5.1 Correct rotation is right-hand (clockwise when viewed from the motor end). Switch power on and off quickly. Observe shaft rotation. to change rotation:
5.1.1 Single-phase motor: Non-reversible
5.1.2 Three-phase motor: Interchange any two power supply leads.

6. Operation

6.1 Before starting, pump must be primed (free of air and suction pipe full of liquid) and discharge valve partially open.

6.2 Make complete check after unit is run under operating conditions and temperature has stabilized. Check for expansion of piping.

7. Maintenance

7.1 Ball bearings are located in and are part of the motor. They are permanently lubricated. No greasing required.

CAUTION: PUMPED LIQUID PROVIDES LUBRICATION. IF PUMP IS RUN DRY, ROTATING PARTS WILL SEIZE AND MECHANICAL SEAL WILL BE DAMAGED. DO NOT OPERATE AT OR NEAR ZERO FLOW. ENERGY IMPARTED TO THE LIQUID IS CONVERTED INTO HEAT. LIQUID MAY FLASH TO VAPOR. ROTATING PARTS REQUIRE LIQUID TO PREVENT SCORING OR SEIZING.

8. Disassembly

8.1 Complete disassembly of the unit will be described. Proceed only as far as required to perform the maintenance work required.
8.1.1 Turn off power.
8.1.2 Drain system and flush if necessary.
8.1.3 Disconnect discharge pipe from pump.
8.1.4 Remove motor hold-down bolts.

8.2 Disassembly of liquid end
8.2.1 Drain the pump body through the drain plug (4).
8.2.2 Remove the casing screws (1) from the motor adapter (17).
8.2.3 Remove the pump body (2) and the o-ring (15) located between the pump body and the seal housing (16).
8.2.4 Remove motor fan cover (24) to expose wrench flats or slot on shaft end.

CAUTION: DO NOT INSERT SCREWDRIVER BETWEEN THE FAN BLADES TO PREVENT ROTATION.

8.2.5 Hold motor shaft at flat or slot to resist rotation and remove impeller nut and washer (5, 6).
8.2.6 The following parts can now be removed from the pump shaft in sequence: Diffuser with o-ring (7, 9), impeller spacer (8),impeller (10), impeller spacer (8), etc. until the complete "hydraulic element" is dismantled. Note: Each diffuser contains an o-ring (9).
8.2.7 Remove the shoulder washer (13) from the pump shaft (18).

NOTE: Further disassembly will require removal of the mechanical seal. It is recommended that a new mechanical seal be installed at reassembly.

8.2.8 Carefully pull the rotary portion of the mechanical seal (14) from the shaft coupling (19).
8.2.9 Remove the seal housing (16) from the motor adapter. The stationary portion of the mechanical seal (14) can now be removed from the seal housing.
8.2.10 Remove the motor screws (21) from the motor adapter and remove the motor adapter from the motor.
8.2.11 To remove the pump shaft (18) from the shaft coupling (19), heat must be applied to the small end of the shaft coupling. This is required to break the bond of the Loctite #271 between the pump shaft and coupling.

CAUTION: DO NOT DAMAGE THE SMALL END OF THE SHAFT COUPLING WHERE THE MECHANICAL SEAL SITS.

Hold the motor shaft at flats or slots to resist rotation. Repeat for removal of the shaft coupling from the motor shaft, this time heating the large end of the shaft coupling.

9. Reassembly

9.1 All parts should be cleaned before reassembly. Remove all cured Loctite from parts using denatured alcohol and wire brush. Allow parts to dry before reassembly.

9.2 Refer to parts list to identify required replacement items. Specify pump index or catalog number when ordering parts.

9.3 Reassembly is the reverse of disassembly.

NOTE: The impeller spacers must be assembled with the larger diameter edge adjacent to each impeller. The last stage diffuser (12) can be identified from the standard by the holes around its circumference,it is recommended that one of these holes be lined up with the discharge port. Fix the hydraulic element by tightening the impeller screw (5) and impeller washer (6) with a torque setting of 10 ft. Position the o-ring (15) on the mechanical seal housing (16), locate the pump body (2) and fit it to the motor adapter (17) with the four screws (1).

Observe the following when reassembling the pump:

9.4 Check for motor shaft runout. Maximum permissible is .002" TIR.

9.5 Apply Loctite 'Primer 7649' and allow 2-3 minutes to dry. Next apply Loctite #271 to motor shaft, thread coupling shaft in place and torque to 15 ft. of torque.

9.6 Apply Loctite 'Primer 7649' and allow 2-3 minutes to dry. Next apply Loctite #271 to pump shaft. Thread pump shaft in place and torque to 15 ft. of torque.

9.7 Check pump shaft runout. Maximum permissible is .010 TIR.

9.8 Lubricate shaft coupling and seal housing stationary seat holder with a 50/50 glycerin and water solution prior to installation of mechanical seal components.

9.9 Apply Loctite "Primer 7649" and allow 2-3 minutes to dry. Then apply Loctite #243 to impeller bolt (5). Thread bolt into pump shaft and torque to 10 lb. ft. of torque.

9.10 Inspect casing o-ring (15) and impeller o-rings (9) for damage or wear and replace if necessary.

9.11 O-rings may be lubricated with glycerin and water solution or petroleum jelly to ease assembly.

9.12 Tighten casing screws to 15 lb.ft. of torque using a star pattern to prevent o-ring binding.

10. Troubleshooting Guide

MOTOR NOT RUNNING
(See causes 1 through 6)

LITTLE OR NO LIQUID DELIVERED
(See causes 7 through 17)

POWER CONSUMPTION TOO HIGH
(See causes 4, 17, 18, 19, 22)

EXCESSIVE NOISE AND VIBRATION
(See causes 4, 6, 9, 13, 15, 16,18,20, 21, 22)

PROBABLE CAUSE

1. Tripped thermal protector
2. Open circuit breaker
3. Blown fuse
4. Rotating parts binding
5. Motor wired improperly
6. Defective motor
7. Not primed
8. Discharge plugged or valve closed
9. Incorrect rotation
10. Foot valve too small, suction not submerged, inlet screen plugged.
11. Low voltage
12. Phase loss (three phase only)
13. Air or gases in liquid
14. System head too high
15. NPSHA too low:
    Suction lift too high or suction losses excessive
    Check with vacuum gauge
16. Impeller worn or plugged
17. Incorrect impeller diameter
18. Head too low, causing excessive flow rate
19. Viscosity or specific gravity too high
20. Worn bearings
21. Pump or piping loose
22. Pump and motor misaligned

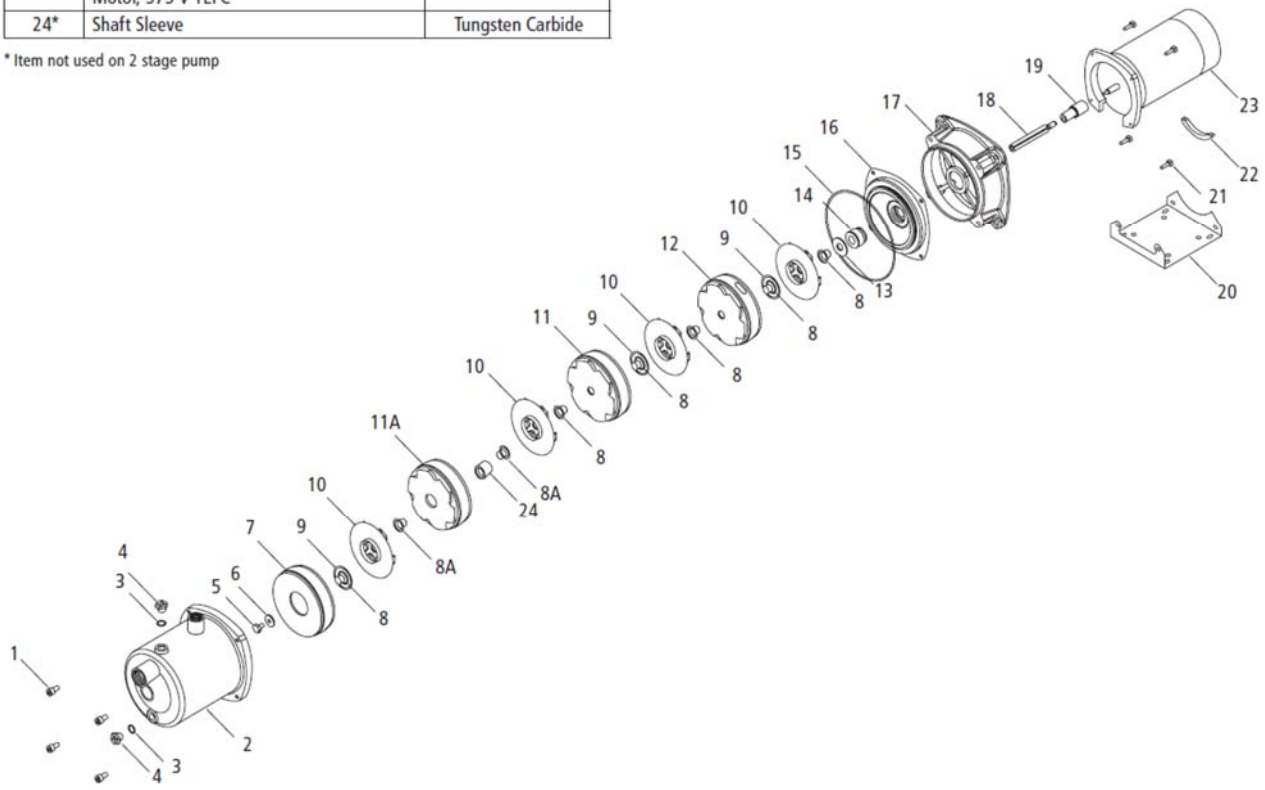
Parts List

Item No.	Part Description	Material
1	Screw, casing	400 SS
2	Pump, casing with plug and Viton o-rings	316L SS
3	O-ring, fill and drain plug	Viton
4	Fill and drain plug	315 SS
5	Impeller bolt	316 SS
6	Impeller lock washer	316 SS
7	Diffuser cover, first stage	316L SS
8	Impeller spacer	316L SS
8A*	Impeller spacer (Intermediate)	316L SS
9	O-ring, impeller	EPR
		Optional Viton
10	Impeller	316L SS
11	Diffuser, intermediate	316L SS
11A*	Diffuser with bushing	316L SS
12	Diffuser, last stage	316L SS
13	Washer, mechanical seal	316 SS
14	Mechanical seal	Varies
15	O-ring, casing	EPR
		Optional Viton
16	Seal housing	316L SS
17	Motor adapter	Aluminum
18	Shaft, pump	316 SS
19	Shaft coupling	316 SS
20	Foot, pump	Steel
21	Screw, motor to motor adapter	Steel
22	Spacer	Rubber
23	Motor, 1 PH ODP	303 SS
	Motor, 3 PH ODP	
	Motor, 575 V ODP	
	Motor, 1 PH TEFC	
	Motor, 3 PH, TEFC	
	Motor, 575 V TEFC	
24*	Shaft Sleeve	Tungsten Carbide

* Item not used on 2 stage pump

Mechanical Seal Application Chart					
Rotary	Stationary	Elastomer	Metal Parts	Part No. Before	Part No. After
				SN: F0264029 •	
Carbon	Silicon Carbide	EPR	316SS	–	10L35
		Viton		10L32**	10L36
Silicon Carbide				–	10L34

• For pumps used in conjunction with the AquaBoost pumping system, use SN F0265181.
** Replacement for 10L29, 10L30 and 10L31



Chapter 10: System Warranties

Limited Warranty

ULTRASORB® System
Limited Warranty

This warranty supersedes and replaces any warranty statements orally made by the Sales Person, Distributor or Dealer or contained in written instructions or other Brochures or informational documents in relation to this product.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF

The Manufacturer warrants, parts only for a period of twelve (12) months from the time of startup, not to exceed fourteen (14) months from the date of shipment, the new **ULTRASORB®** System to be free from defects in material and workmanship under the normal use and service when operated and maintained in strict accordance with the **ULTRASORB®** System operating instructions.

The Manufacturer's obligations under this warranty is being limited to repairing or replacing any part found to its satisfaction to be so defective, provided that such part is, upon request, returned to the Distributor or Manufacturer, with freight prepaid. This warranty does not cover parts damaged by decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from misuse, abuse, or any other than its intended use, accident, neglect, or from improper operation, maintenance, installation, modification or adjustments.

This warranty does not cover parts or equipment used with the **ULTRASORB®** System that are not made by the manufacturer, since these items are covered by warranties from the respective manufacturer. The Manufacturer makes no warranty as to electrical apparatus or other materials not of its manufacturer.

The Manufacturer's sole responsibility shall be limited to repair or replacement of the equipment within the terms stated herein above.

The Manufacturer shall not be liable for consequential or punitive damages whether or not caused by manufacturer's negligence or resulting from any expressed or implied warranty or breach thereof. Consequential damages for the purpose of this agreement shall include, but are not limited to, the loss of use, income or profit, or loss of or damage to property occasioned by or arising out of in operation, use, the operation, installation, repair, or replacement of the equipment or otherwise.

It is understood that any controversy or claim arising out of or relating to the **ULTRASORB® System Warranty** herein or the alleged breach thereof, shall be settled by arbitration in accordance with the rules of the Arbitration Association of America, Palm Beach County, Florida, and judgment upon the award rendered by the arbitrator(s) may be entered in any court baring jurisdiction thereof.

PROCESS PERFORMANCE WARRANTY

The Manufacturer Warrants that when installed and operated in accordance with the Manufacturer's written instructions, the **ULTRASORB®** System will remove dirt, oil and grease from wash water. No other warranty expressed or implied should be considered valid. There are numerous operating conditions, which will affect the efficiency of the **ULTRASORB®** System, thereby making any general water quality statement unrealistic.

WARRANTY SERVICE

In order to validate your warranty, fill out the **Warranty Validation Form** and return to ***RGF*** at the address below:

RGF WARRANTY DEPARTMENT
Outside of Florida (800) - 842 - 7771
In Florida (561) - 848 - 1826
or FAX (561) - 848 - 9454

To obtain warranty service contact ***RGF*** and a warranty representative will help with the warranty problem and determine the status and a **Warranty Authorization Number** will be given at that time. Be prepared to answer specific questions on the problem at hand. If there are warrantied parts that need to be returned, fill in the **Warranty Authorization Number on the Warranty Request Form,** along with the items being submitted for warranty, and a brief explanation of the problem or defect, and return it and the part(s) to:

RGF Environmental Group, Inc.
c/o Warranty Department
1101 W. 13th Street
Riviera Beach, Florida 33404

Limited Warranty Policy

ULTRASORB® System
Limited Warranty Policy

***RGF* ENVIRONMENTAL GROUP, INC.** ["Manufacturer"] warrants the **ULTRASORB® System** to be free from DEFECTS in Material and Workmanship.

HOW LONG IS THE WARRANTY?

- For twelve (12) months from the date of initial startup of the system; not to exceed fourteen (14) months from the date of delivery.
- The Installation / Startup Record and Warranty Registration Form should be signed and dated by an authorized officer or employee of the customer and returned to *RGF* promptly to activate the warranty.

HOW DO I CONTACT *RGF* ENVIRONMENTAL GROUP ABOUT MY WARRANTY, A QUESTION, OR A COMPLAINT?

- A question or a complaint may be addressed directly by your local Distributor or dealer.
- If they cannot answer the question or complaint directly, then call or FAX the Warranty Department at *RGF* at:

***RGF* WARRANTY DEPARTMENT**
Outside of Florida (800) - 842 - 7771
In Florida (561) - 848 - 1826
or FAX (561) - 848 - 9454

ARE THERE ANY PARTS THAT ARE NOT COVERED BY THIS WARRANTY? (That the Manufacturer will not repair or replace)

- Parts that are damaged by decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from misuse, abuse, any other than it's intended use, accident, neglect, or from improper operation, maintenance, installation modification or adjustments.

- Parts not made by the Manufacturer, such as the electric pressure pump motor or other materials not of its manufacturer. However, *RGF* will process the claim with the pump or other manufacturer.

WHAT SHOULD BE DONE IN THE EVENT THAT THE EQUIPMENT IS DAMAGED BY SHIPPING?

- Immediately upon receipt of the system, the purchaser is responsible to take the shipping containers off of the truck and inspect the equipment and parts for damage.

- If there is any visible damage to the equipment:
  1. Notify the driver of the courier company immediately and write on the Bill of Lading what is damaged or missing.
  2. Call ***RGF*** immediately at **1 - (800) - 842 - 7771** outside of Florida, **1 - (561) - 8484-1826** in Florida, or **FAX 1- (561) - 848 - 9454.**

WHAT IF DAMAGE IS FOUND ON THE EQUIPMENT AFTER THE COURIER HAS LEFT?

- Claims for concealed shipping damage must be reported to the courier and a copy sent to *RGF* in writing via **FAX 1 - (561) - 848 - 9454** or certified U.S. mail within fifteen (15) days from the date of delivery.

  NOTE:
  The courier company will not cover the damages if the foregoing steps are not adhered to.

STEPS THAT SHOULD BE TAKEN IF WARRANTY WORK OR REPLACEMENT IS NEEDED.

- Call your local distributor or *RGF* Warranty Department and notify them of the problem or malfunction. Be prepared to be very descriptive with the problem.

- If it is determined that a part has malfunctioned due to defect, a **Warranty Authorization Number** will be given for tracking the part. Fill out the **Warranty Request Form** along with the Warranty Authorization number and return it along with the defective part prepaid to:

  ***RGF* Environmental Group, Inc.**
  c/o Warranty Department
  3875 Fiscal Court
  West Palm Beach, Florida 33404

THINGS THAT SHOULD BE DONE TO HELP KEEP THE ULTRASORB SYSTEM RUNNING EFFICIENTLY.

- Read the Operations Manual thoroughly.
- Make sure all of the employees who operate the system are fully trained on the procedures for operating the system and follow preventive maintenance routines strictly.
- Do not run water that has contaminants through the system that it is not designed to remove.
- Make sure the system is operated in accordance with the Manufacturer's suggested instructions.
- Replace filters as recommended in the Operations Manual.
- Control the water quality in accordance with *RGF*'s suggested guidelines.
- Keep sump pits, trenches, and weirs cleared of heavy sediment build up. Heavy solids build up will cause the sump pump to overheat and fail to operate properly. Failure to prevent this will void the sump pumps warranty.
- Lack of a water clarifier (such as hydrogen peroxide, chlorine, WC-1, Ozone, etc.) will cause algae to grow resulting in plugged filters and foul smell.

Chapter 11: Product Registration and Return Forms

Warranty Request Form

ULTRASORB® System
Warranty Request Form

NOTE: THIS FORM MUST BE COMPLETED AND ACCOMPANY ALL RETURNED ITEMS

Warranty Authorization Number: W-_____

CUSTOMER:
NAME _____
ADDRESS _____
_____
PHONE _____ FAX _____

DISTRIBUTOR:
NAME _____
ADDRESS _____
_____
CONTACT _____

UNIT:
MODEL _____
SERIAL # _____
DATE OF PURCHASE _____

ITEMS BEING SUBMITTED FOR WARRANTY:

PLEASE LIST THE PARTS AND GIVE A BRIEF DESCRIPTION OF THE PROBLEM.

ITEMS
1) _____
2) _____

DESCRIPTION (COMMENTS)
1) _____
2) _____
3) _____

SHIP TO: ***RGF ENVIRONMENTAL GROUP, INC.***
c/o WARRANTY DEPARTMENT
3875 FISCAL COURT
WEST PALM BEACH, FLORIDA 33404
FAX 407-848-9454

(FOR *RGF* USE ONLY)
DATE ITEMS RECV'D _____
RECEIVED BY _____

___REPLACEMENT PART SENT/WARRANTY APPROVED ☐ WARRANTY DENIED ☐

Warranty Validation Form

ULTRASORB® System
Warranty Validation Form

To validate the Warranty for the system, this form must be read, signed and returned to:

RGF Environmental Systems, Inc.
c/o Warranty Department
3875 Fiscal Court
West Palm Beach, Florida 33404
FAX 407-848-9454

1. I have inspected the system upon arrival for shipping damage and have reported any problems to the local distributor, the courier company, or *RGF* within the required time period.

2. I have been provided with training on the operation and procedures for the system by the distributor or *RGF* representative, during the installation and startup of the system.

3. I understand it is the customer's responsibility to:

- Regularly monitor and maintain the water chemistry of the system and to utilize properly only any chemicals or cleaning agents that are compatible with the equipment.
- To regularly clean out the sump pit and perform suggested preventive maintenance on the system in order to keep the system in good working order. I understand that failing to do so will adversely effect the efficiency of the system. I also understand, that it is my responsibility to properly dispose of the used filters, pit sediment, and any other by-products accordingly.
- Protect the system from extreme (high/low) temperatures to prevent damage to the components and piping of the system.
- Notify the local distributor or *RGF* Warranty Dept. immediately upon any malfunction of the system in order to receive warranted work or parts.

4. I understand that any controversy or claim arising out of or relating to the **ULTRASORB® System Warranty** herein or the alleged breach thereof, shall be settled by arbitration in accordance with the rules of the Arbitration Association of America, Palm Beach County, Florida, and judgment upon the award rendered by the arbitrator(s) may be entered in any court baring jurisdiction thereof.

I hereby acknowledge the above.

Customers Name _____
Address _____
_____

Signature _____ **Date** _____

Installation / Startup Record

ULTRASORB® System
Installation / Startup Record

Model Number _____ **Installation Date** _____

Serial Number _____ **Start-Up Tech.** _____

Distributor _____

Customer _____

Address _____

_____

Phone ( )_____ **FAX ( )**_____ **Contact**_____

Names of Trainees	Position	Initials
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

What is Being Cleaned_____ **Hr's. Per Day**_____

Washpad Design & Const. By?_____

Is the Washpad Satisfactory? Yes ☐ No ☐. If No, Explain_____

_____

_____

Was the Unit Missing Parts? Yes ☐ No ☐. If Yes, Explain_____

_____

_____

Did the Unit Have Shipping or Hidden Damage? Yes ☐ No ☐. If Yes, Explain_____

_____

_____

List Any Options/Modifications with this Unit._____

_____

_____

Installation / Startup Checklist

ULTRASORB® System
Installation / Startup Checklist

MAINTENANCE PROCEDURES - CHECK IF COVERED & APPLICABLE

_____ **Overall System Description**
_____ **EPA & Sewer Rules**
_____ **Wash Pad Maintenance**
_____ **Solids Cleaning Procedure**
_____ **Bleed Lines**
_____ **Solids Grid**
_____ **Filter Media**
_____ **Hydrocarbon Absorber III**
_____ **Jet Pump and Switch**
_____ **TurboHydrozone**
_____ **Polishing Filters**
_____ **Pressure Tank**
_____ **Options:** _____
_____ **Options:** _____

_____ **Sump Pump & Maintenance**
_____ **Electrical, Shutoffs, Etc.**
_____ **Centrifugal Separator**
_____ **Oil Accumulator**
_____ **Coalescing Tubes**
_____ **Hydrocarbon Absorber II**
_____ **Centrifugal Pump**
_____ **Chlorinator**
_____ **Fresh Water Make-up**
_____ **Air Compressor**
_____ **Pressure Gauges**
_____ **3 Way Control Valve**
_____ **Options:** _____
_____ **Options:** _____

CRITICAL FUNCTIONS AND PROCEDURE DISCUSSIONS

_____ **Basic Water Chemistry;**
_____ **pH, Alkalinity, TDS**
_____ **Algae/Bacteria Control;**
_____ **Chlorine, Hydrogen Peroxide**
_____ **Water Cycling, WC-1**
_____ **Water Testing; ETS Kit,**
_____ **pH Paper, TDS Meter**

_____ **Operator Safety;**
_____ **Clothing, Ventilation, Etc.**
_____ **Cleaning Agents; Enviro-**
_____ **Control, Ultra-Safe**
_____ **Water Management**
_____ **Recycled / Fresh Water**
_____ **Where to Get Help; Manuals,**
_____ **Distributor, *RGF***

CUSTOMER HANDOUTS AND SUPPORT MATERIAL

_____ **Operating Manuals**
_____ **Maintenance Video**

_____ **Water Test Kit**
_____ **Spare Parts List**

CUSTOMER EVALUATION OF START-UP TRAINING:

How Would You Rate Your Training? Good ☐ Fair ☐ Poor ☐

General Comments_____

_____

_____

_____

***RGF* Tech. Rep. Signature**_____

Trainees Signature_____

Client Questionnaire

ULTRASORB® System
Client Questionnaire

Company Name_____

Contact Person_____

Location_____

Phone (____)_____

***RGF* Dealer/Salesman**_____

Purchase Date (approx.)_____

Model_____ **Serial Number**_____

HOW WOULD YOU RATE THE FOLLOWING:

	GOOD	FAIR	POOR
General Operation	_____	_____	_____
Recycled Water Quality	_____	_____	_____
Quality of System	_____	_____	_____
Service & Support	_____	_____	_____
Warranty	_____	_____	_____
Installation / Training	_____	_____	_____
Safety	_____	_____	_____
***RGF* Dealer / Salesman**	_____	_____	_____
Value	_____	_____	_____

Would you purchase another *RGF* System? Yes ☐ No ☐

Comments_____

_____

_____

_____

_____

Completed By: _____ **Date**_____

Please return this form to:

RGF Environmental Group
c/o Customer Service Dept.
3875 Fiscal Court
West Palm Beach, FL 33404
Fax: 407-848-9454