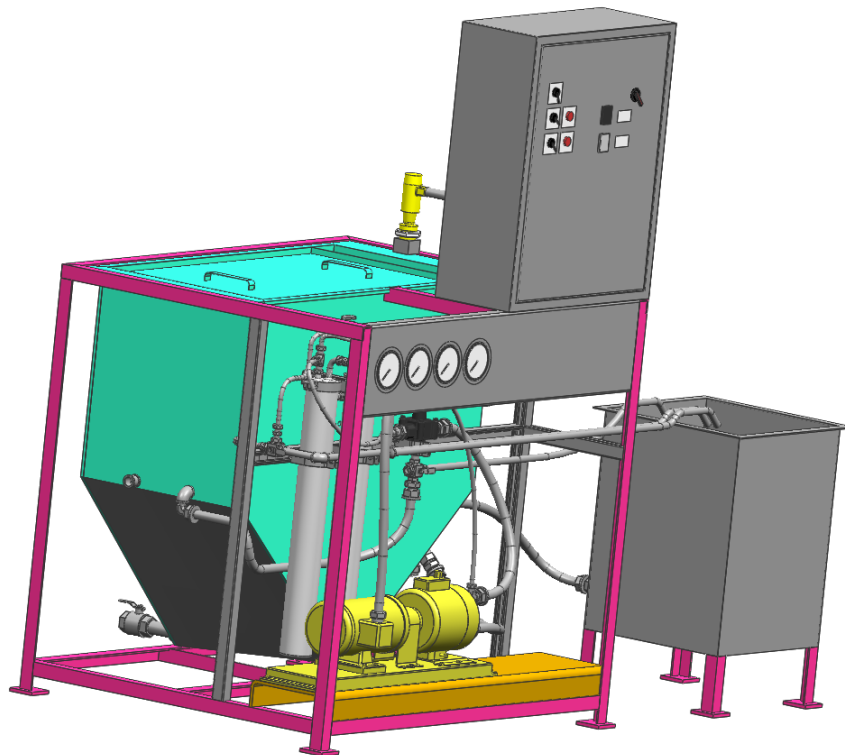




**SEPARADE-R**  
**CLEANER RECYCLING SYSTEM**

*Operation Manual*





## SEPARADE-R CLEANER RECYCLING SYSTEM

1. Introduction
2. Important Set-up Recommendations
3. Operational Instructions
4. Operational Diagram
5. Machine Operation and Maintenance
6. Misc. Documentation and Forms
7. Basic Trouble Shooting Guide
8. Glossary of Terms
9. Parts List Information
10. Operational Warnings
11. Warranty

### 1. Introduction

Thank you for purchasing the SEPARADE-R cleaner recycling system. The Clear Solutions SEPARADE-R system combines state-of-the-art technology with time-tested materials and chemical formulations, making the SEPARADE-R a high-performance and high-value purchase.

The purpose of this manual is to provide basic information for installation, start-up, operation, maintenance, and troubleshooting of the unit.

Installation Date: Jan. 2007  
Model: Sep-R-003  
Serial Number: DDC-010107-04

### 2. Important Set-up Recommendations

- It is important that the SEPARADE-R ~ Aqueous Cleaner Recycler is used



## SEPARADE-R CLEANER RECYCLING SYSTEM

properly following the directions outlined in this Manual.

- Always refer to the materials safety data sheet for proper handling of all chemicals for use in this unit.
- All materials must be stored and disposed of in accordance with all local and federal regulations.
- The SEPARADE-R ~ Aqueous Cleaner Recycler will heat solutions to high temperatures. Care must be taken once the unit is in operational mode.
- The products used to clean SEPARADE-R ~ Aqueous Cleaner Recycler filtration system are compatible with the system components but may not be compatible with the products and / or equipment used in the cleaner tank. Separate dumping of the chemicals used to clean the system may be necessary.
- The use of silicone or modified silicone based anti-foams will irreversibly foul the SEPARADE-R filter modules and must not be used in any part of the process line or formulation of cleaners.

- The maintenance of the SEPARADE-R is paramount to the successful use of the cleaner recycling system. As the SEPARADE-R modules foul, the permeate flux rate will steadily decline and the system must be properly cleaned. This step is addressed later in this manual.

### **3. OPERATIONAL INSTRUCTIONS**

The SEPARADE-R cleaner recycling systems are designed to remove both emulsified oils and free floating oils from alkaline cleaner baths. The system utilizes specially designed separation techniques that operate over a broad range of operating conditions. The filter modules are designed to operate between 50 and 140 psig and are rated to 150 psig. The SEPARADE-R modules are capable of tolerating streams of pH from 0 to 14 and temperatures over 200° F. The system consists of one or more SEPARADE-R modules, pump w/electric motor, VFD Variable Frequency Drive, relief valve, concentrate tank w/multiple drain/fill fittings, heater w/electric controller, level control w/electric controller, pump w/electric motor (feed tank), solenoid controls, valves, piping and hardware necessary to complete system design. The system incorporates chemical formulations that maximize recovery and reuse of the active ingredients.



## SEPARADE-R CLEANER RECYCLING SYSTEM

### 3.1 Before you Begin

Carefully read and follow these instructions.

- Local codes may apply. Please follow all code requirements when installing the SEPARADE-R.
- The amount of particulate such as dirt, scale, metal shavings, etc. permitted to enter the SEPARADE-R must be minimized for maximum effectiveness and SEPARADE-R membrane life expectancy.
- Products such as fibers from gloves or broken down paper products will quickly lower the permeate rate and will not be readily removed during the normal cleaning cycle. The membrane cartridges will need to be sent out for cleaning and possible replacement if they have been irreversibly damaged.
- It is recommended to install an appropriately sized and maintained pre-filter system upstream of the SEPARADE-R system.
- Again it is imperative that silicone and modified silicone products be excluded

from the SEPARADE-R and the cleaning systems.

- We recommended the use of a Clear Solutions formulated cleaner for all cleaning applications. These cleaners are specifically formulated for use with the SEPARADE-R system.
- Collected concentrated oil should be dumped into a waste oil holding tank for proper disposal.

### 3.2 Installation Instructions and Suggestions

Take care when unloading the SEPARADE-R as weight distribution may be uneven.

#### Pre-Installation Inspection

Upon delivery, inspect the unit for exterior damage that may have occurred during shipping and handling. Carefully, remove the covers and inspect the interior of the unit to insure that the coalescing cubes and internal piping are secure and have not been damaged during transport.

**DO NOT MOVE THE SEPERADE-R UNLESS EMPTY.**

REFER TO ENCLOSED MANUFACTURES AND CONTROL PANEL WIRING DIAGRAMS AND



## SEPERADE-R CLEANER RECYCLING SYSTEM

### INSTALLATION INSTRUCTIONS FOR ELECTRICAL DETAILS!

#### Power and Electrical Requirements

**WARNING: BEFORE OBTAINING ACCESS TO TERMINALS, ALL SUPPLY CIRCUITS MUST BE DISCONNECTED.**

System will operate most efficiently when the following considerations are adhered to.

Cleaner solutions and any products introduced into the cleaning system must not contain the following chemicals or permanent loss of permeate flow may result:

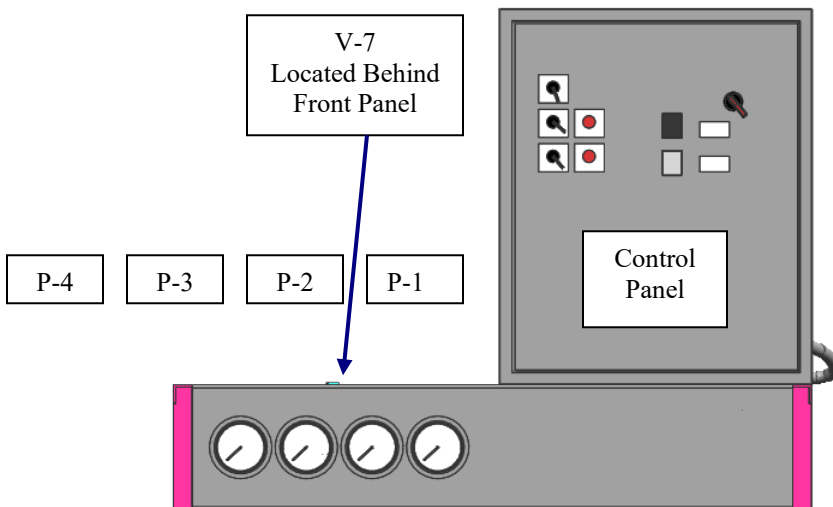
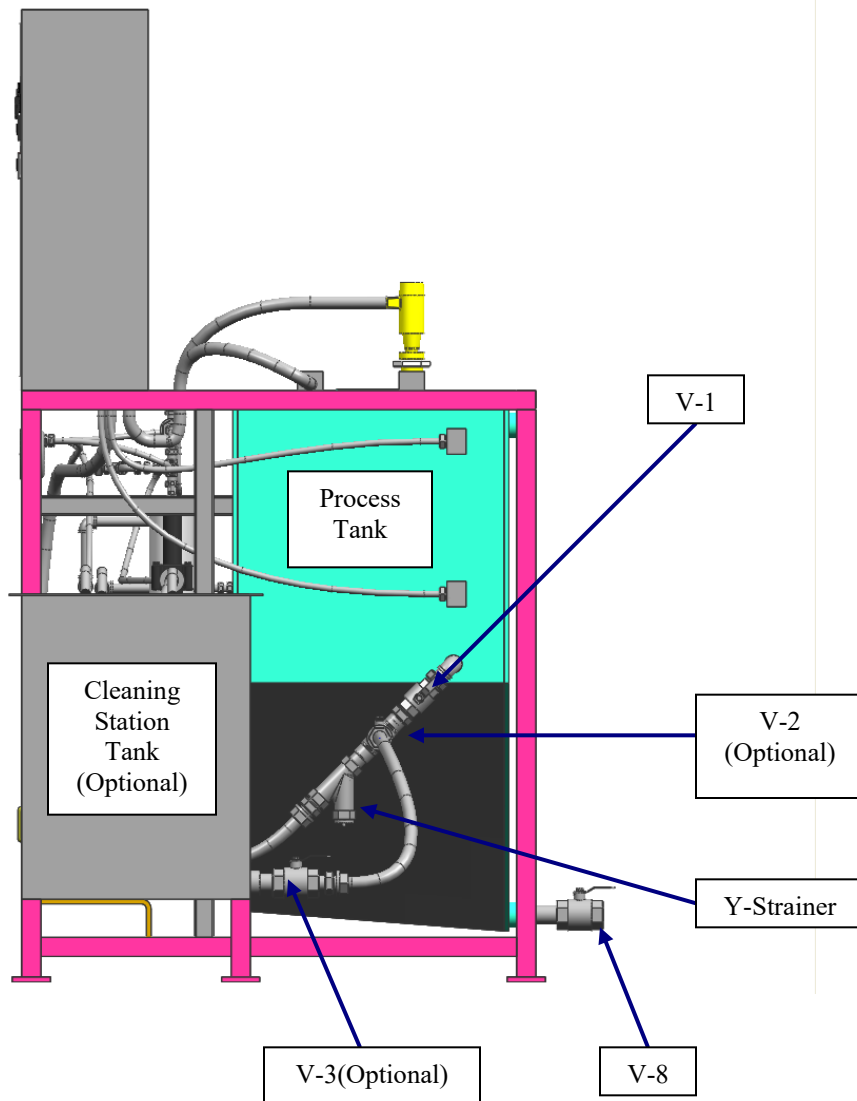
Silicone and its Derivatives  
Free chlorine  
Iodine compounds  
Quaternary germicides  
Cleaner Chemistries not pre-approved by Clear Solutions

**Note:** This manual is a generic example of all the pertinent operational

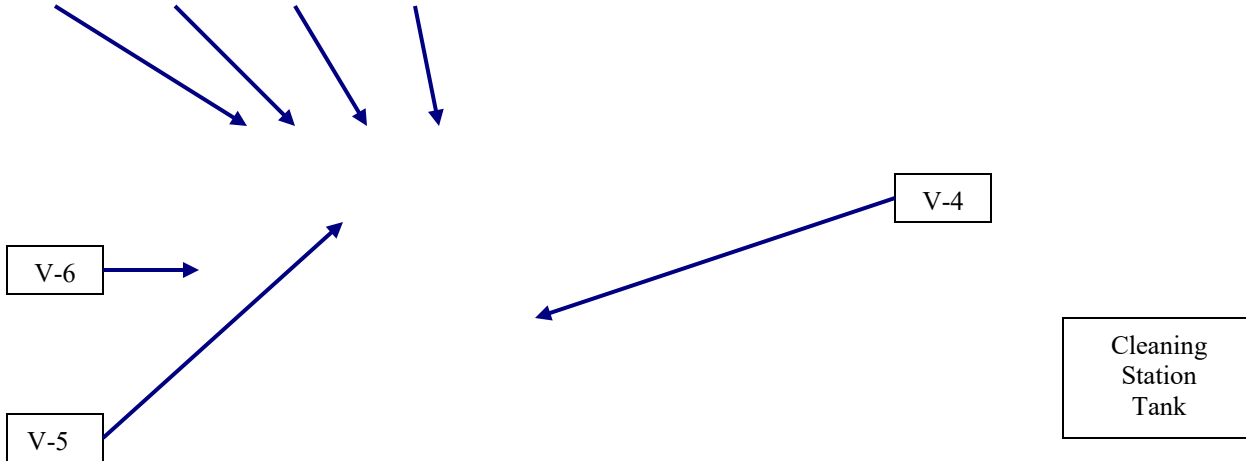
sequences involved in the use of the SEPERADE-R Cleaner Recycling system. Your system may have more valves or the valves may be numbered differently than shown due to installation requirements at your location. This system is also shown with the optional side cleaning system which also affects the number of valves provided with the system. A customer specific manual can be provided if requested after the system is put in place and operational variable and hook-ups are finalized.

### 3.3 Operation of your SEPERADE-R Cleaner Recycling System (Systems without the optional side cleaning station have slightly different valves that the drawings below.)

**SEPARADE-R CLEANER RECYCLING SYSTEM**



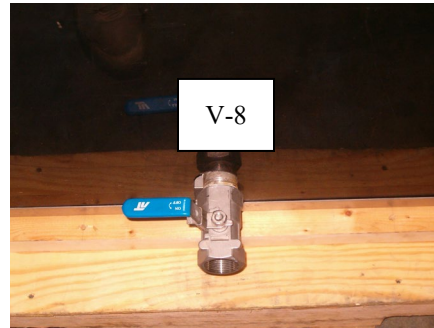
## SEPARADE-R CLEANER RECYCLING SYSTEM



- P-1 ~ Pressure Gauge for outlet of Process Pump.
- P-2 ~ Pressure Gauge for inlet of the 1<sup>st</sup> Sep-R Module.
- P-3 ~ Pressure Gauge for outlet of 1<sup>st</sup> Sep-R Module and inlet of 2<sup>nd</sup> Sep-R Module.
- P-4 ~ Pressure Gauge for outlet of 2<sup>nd</sup> Sep-R Module.
- VALVE 1 ~ 1<sup>st</sup> valve from P.T. to Process Pump
- VALVE 2 ~ Bypass Valve for Cleaner Station Optional
- VALVE 3 ~ Cleaning Tank Operational Valve Optional
- VALVE 4 ~ 3-Way Directional Relief Bypass Valve Optional
- VALVE 5 ~ 3-Way Directional Permeate Bypass Valve
- VALVE 6 ~ 3-Way Directional Concentrate Return Valve Optional
- VALVE 7 ~ Back Pressure Valve
- VALVE 8 ~ Process Tank Drain Valve

### 3.4 System Start-up

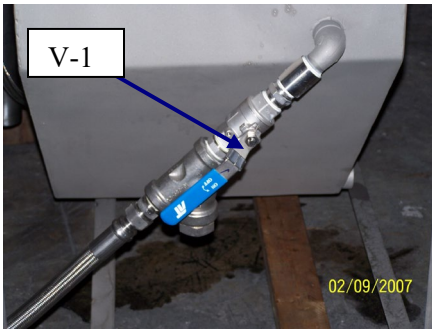
- a. Make sure the Process Tank Drain Valve V-8 is closed.



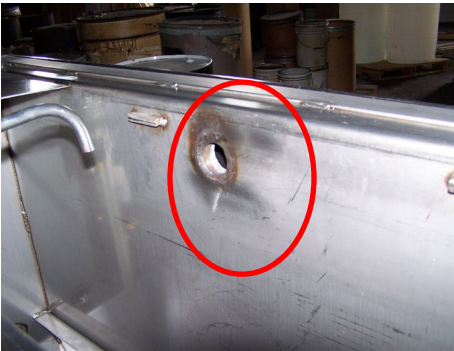
- b. Open Valve V-1.



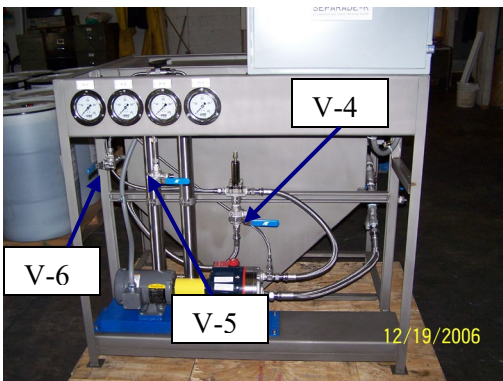
## SEPARADE-R CLEANER RECYCLING SYSTEM



- c. Fill unit Process Tank with water until it reaches a level of approximately 3 inches below the overflow hole in the back of the tank and add 2 gallons of cleaner to the Process Tank.



- d. Place valves V-4, V-5, and V-6 in the vertical position.



- e. Turn main power switch located on the control panel to the ON position.



- f. Turn ON the process pump switch located on the control panel.



**Note:** Pump will start in soft start mode to eliminate air from the system plumbing. It will take 60 seconds to obtain full operational speed.

- g. Turn on heater switch located on the control panel.

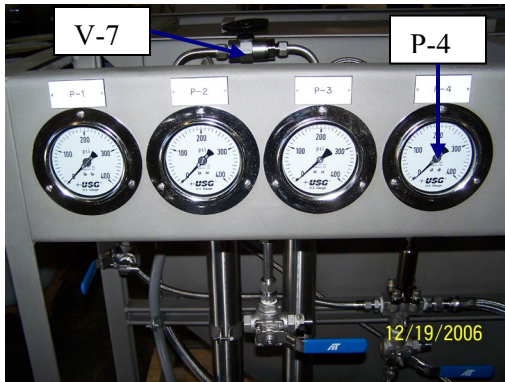




## SEPARADE-R CLEANER RECYCLING SYSTEM

**Note:** Heater needs to be on at all times when the system is in operational mode.

- h. Once unit reaches the ideal operating temperature of 160 degrees it will be necessary to adjust Valve #7 to create a back pressure on pressure gauge P-4. Pressure gauge P-4 needs to be 50 psig.



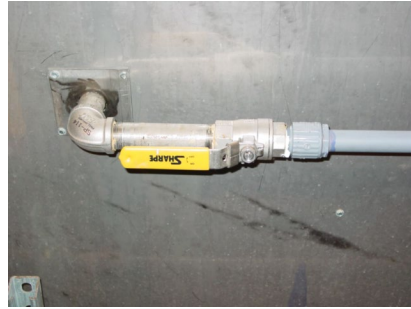
**Note:** At this time you may hear the relief valve begin to open and close. This operational noise is normal for the Hydracell safety relief valve.

**This concludes system start-up mode.**

### 3.5 Bringing the SEPARADE-R Unit On-line (Operational Mode)

**Note:** Bringing the unit on-line allows the solution from the Wash Tank to be processed through the SEPARADE-R ~ Aqueous Cleaner Recycler System.

- a. Open Valve from Wash Tank to the Feed Pump.



- b. Be sure the Bag Filter (if supplied) is closed and ready for operation.



- c. Open Valve after Bag Filter to the Inlet Port on the SEPARADE-R.



- d. Turn the Feed Pump switch located on the control panel to the automatic position.

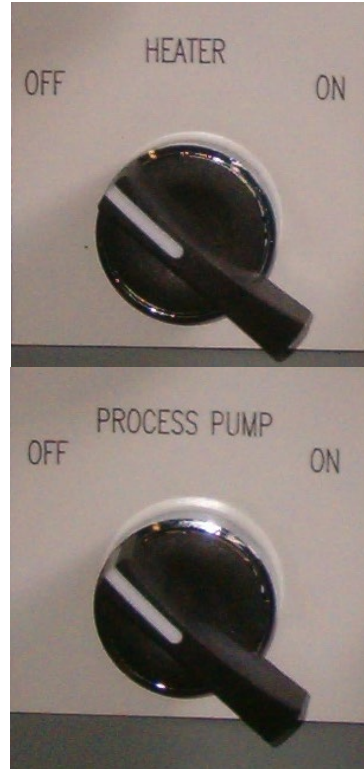
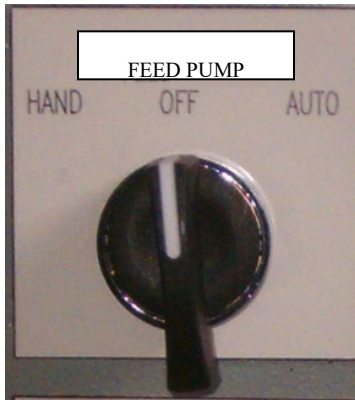
## SEPARADE-R CLEANER RECYCLING SYSTEM



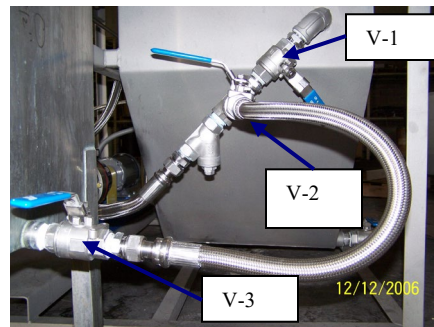
The unit is now on line.

### 3.6 System Shutdown

- a. Turn off the Feed Pump, Heater, and Process Pump switches located on the Control Panel.



- b. Close valve V-1 and Open Valves V-2 and V-3.



- c. Turn Valves V-4, V-5, and V-6 to the Horizontal position. This will prepare the system for the “Cleaning Cycle”. The solution flows will now be sent to the Cleaning Cycle Tank

## SEPARADE-R CLEANER RECYCLING SYSTEM

and will no longer flow to the wash tank.

**The system is now shut down and ready for cleaning if necessary.**

### 3.7 System Cleaning

Follow the shut down procedures as shown in Section 3.6 (System Shutdown)

#### a. Drain and Clean Process Tank

**Note:** Make sure drain plumbing is properly plumbed into an approved oil holding sump or other Containment Vessel.

##### a. Open Valve V-8

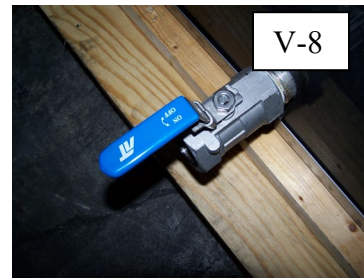


**Note:** All materials must be stored and disposed of in accordance with all local and federal regulations.

- b. After Process Tank is empty, using clean water wash down the inside of the process tank until oils and soils are completely removed.

**Note:** It is important that the holding tank is large enough to hold the entire volume of the Process Tank and wash down volume.

##### c. Close valve V-8



- d. At this point remove the cap from the bottom of the “Y” Strainer and clean the screen of debris and replace. Be sure to tighten the cap to prevent leaking.



- e. Fill unit process tank with water until it reaches a level of approximately 3 inches below the overflow hole in the back of the tank.



## SEPARADE-R CLEANER RECYCLING SYSTEM



**Note:** During shut down valves were placed in the proper position for cleaning.

- f. On the main panel turn the heater to ON position.



- g. On the main panel turn the Process Pump switch to the ON position.



- h. Allow unit to heat up to 170 degrees (adjust heater control to the 170 set point using the arrows located on the Watlow Controller).



**Note:** Temperature reading is on the control panel door.

- i. Dissolve approximately 15 pounds of CMS-3000-MC SEPARADE-R powder cleaner in a 5 gallon bucket with hot water and pour into the “Process Tank”.
- j. Allow system to run in cleaning mode at 170 degrees for approximately 2 hours.

**Note:** Always refer to material safety data sheet for proper handling of all chemicals used in the SEPARADE-R ~ Aqueous Cleaner Recycler unit.

- k. Check the permeate rate flux. As follows:
- l. Capture 10 seconds of permeate flux at the end of the return tube located in the Cleaning Station Tank in a graduated cylinder.

**Note:** Mills of captured solution multiplied by 0.01585 = Gallons per Hour.



## SEPARADE-R CLEANER RECYCLING SYSTEM

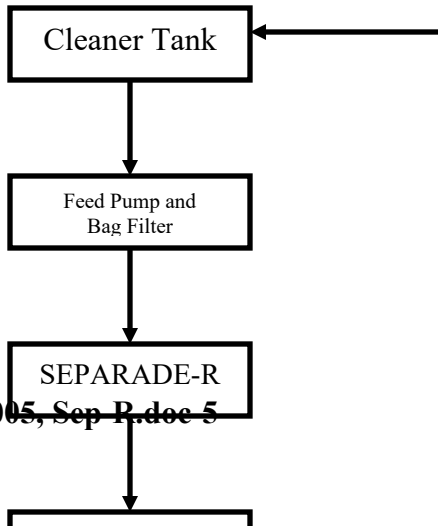
When the permeate flow rate is greater than 11 Gallons per Hour the system is clean and ready to be put back into operation. If this number is not achieved call your Clear Solutions representative as a membrane blinding may have occurred due to high levels of solids in the wash tank.

m. Repeat steps A thru H of the this section, with the following exceptions:

1. Set temperature back to the operating parameter of 160 degrees.
2. Refer to Section 3.4 for proper valve placement for system re-start.
3. Add 2 gallons of Wash Tank Cleaner instead of CMS-3000-MC to prepare for bringing the system back online.

**Note:** At this point the system can be put back into operation using the steps from "Section 3" Bringing the Unit On-line.

### 4 Operational Diagram



Rev. 005, Sep R.doc 5

## 5 MACHINE OPERATION AND MAINTENANCE

The operation and maintenance of the SEPARADE-R system is relatively simple, but requires regular data recording and routine preventative maintenance for proper operation and the longevity of system. It cannot be emphasized enough the importance of filling out the Daily Log Sheet (Page 16) during each operating shift. If you have questions concerning the operation of your machine or the method of data collection, contact CLEAR SOLUTIONS Engineering Department.

There are four preventative maintenance procedures, which must be completed on a regular basis, they are as follows:

1. Maintain the pre-filtration equipment according to manufactures recommendations.
2. Clean the SEPARADE-R modules with approved Clear Solutions cleaners as needed.
3. **Periodic replacement of wear parts (diaphragm) in the Hydracell relief valve. (Every 4 months)**
4. **Periodic oil changes of oil located in the Hydracell Process Pump. (Every 3000-5000 hours) See OEM Manual for complete instructions.**



## SEPARADE-R CLEANER RECYCLING SYSTEM

### 6 Misc. Documentation and Forms

#### Daily Log Sheets

A Daily Log Sheet, which includes general operating conditions (pressures, flows, and concentrations) and routine or special maintenance (pre-filter changes, adjustments, cleaning, etc.) must be kept. Copies of the Daily Log Sheet can be made from the Template (Page 16). Clear Solutions will require copies of Daily Log Sheets if a warranty question arises.

**IMPORTANT: Maintain a log of inspections, daily operational variables and maintenance work**

**and have it available for ready reference. An example of a log sheet is attached.**

#### EXAMPLE







## SEPARADE-R CLEANER RECYCLING SYSTEM

This trouble shooting guide can assist you in identifying problems that you may experience with the SEPARADE-R system. The operator can easily correct many of these problems; however, for those that persist or are not understood, you should contact your Clear Solutions Technical Sales and Service Representative.

TROUBLE SHOOTING GUIDE		
PROBLEM	POSSIBLE CAUSE	REMEDIES
LOW OPERATING PRESSURE	Insufficient feed pressure or flow	Be sure valve V-1 is open. Check valve for restrictions
	Clogged Y-Strainer	Shut down unit and remove Y-Strainer media and clean.
	Dirty or fouled SEPARADE-R modules	Run a system Cleaning
	Insufficient electrical power	Verify proper voltage is present. Check fuses and circuit breakers.
	Pump motor not operating properly	Contact Clear Solutions for repair or replacement of the pump or motor.
	Concentrate return valve not properly adjusted.	Refer to back pressure setting for proper valve adjustment.
Low Permeate Production	Low operating Pressure	See Above
	Machine operating with a low temperature	Check the solution temperature in the Process Tank. Be sure the controller is set to 160.
	Dirty or Fouled SEPARADE-R Module	Run a system cleaning
	Back Pressure in the Permeate Return Line	Check for restrictions in permeate plumbing
Main Power on but system not running	No power to the machine	Ensure power is on and all fuses and circuit breakers are operational.
Main Power on but system not running	Low level Shut Off	Be sure system has the proper operating solution level in the Process Tank
	High Level Shut Off	Be sure system has the proper operating solution level in the Process Tank
	Thermal overload of motor	Allow machine to cool. Check



## SEPARADE-R CLEANER RECYCLING SYSTEM

		the amp draw to the machine
	Pump motor or pump failure	Check the fuses or circuit breakers; measure the voltage. Contact Clear Solutions for service.

### Cleaning

Cleaning the SEPARADE-R on a regular scheduled basis is paramount. Contaminants will build-up to form a layer in the SEPARADE-R membrane surface, this reduces the permeate flow. Permeate flow rates (flux) are used to determine when the cleaning of the membrane is required. Use this as a guide will help you maintain the system at an average flux rate needed to meet the required extension of bath life, chemical reduction, and/or oil contaminant percentages. **A decrease in permeate flow and/or an increased pressure noted on the inlet pressure gauges will indicate when cleaning is required.**

Clear Solutions recommends cleaning the system approximately every 2-4 weeks to assure peak SEPARADE-R module performance and long SEPARADE-R module life. **The amount and type of oils and soils in your system will directly influence this cleaning schedule, reducing or increasing the frequency necessary to maintain the performance needed. Cleanings rates will need to be determined as the system is used and equilibrium is established through the actual operational variables on-site.**

## Recommended Equipment and Supplies

### Safety

- 1) Safety Glasses
- 2) Chemical gloves
- 3) Long sleeves or lab coat
- 4) Safety shoes

### Miscellaneous Tools and Supplies

- 1) Plastic 200 ml graduated cylinder (1)
- 2) Plastic 100 ml beakers (4)
- 3) Excel spreadsheet for recording system/chemical data

The SEPARADE-R Cleaner Recycling System is fully assembled and tested before shipping. However, some of the parts may have come loose or out of place in transit. Proper operation, maintenance, and monitoring of the SEPARADE-R system are important factors in assuring successful long-term performance. The following steps should be completed on startup of the system.



## SEPARADE-R CLEANER RECYCLING SYSTEM

- **Permeated Volume**

As a clean SEPARADE-R is brought on-line, a high flux rate will be observed. As time passes the flux rate will decrease and decline at a constant rate. At the beginning of the run the SEPARADE-R is clean, and the concentration of the polarization layer has not yet developed to restrict flux. The flux will decrease as the concentration of the polarization layer is deposited and the system reaches equilibrium. After the system reaches equilibrium the flux will decline as more permeate is produced. Most foulants are swept off the SEPARADE-R surface into the concentrate return stream, however some are cumulative and directly relate to the amount of permeate produced. These foulants will be removed in the cleaning cycle.

## 8 Glossary of Terms

PERMEATE FLUX RATE - The Permeate Rate is the flow rate of purified solution that passes through the SEPARADE-R in gallons / minute (gpm). Specified permeate rates are based on a feed temperature of 160°F. Permeate rate will vary with temperature.

PRESSURE GUAGES- Used to monitor the system performance and cleaning schedule.

SEPARADE-R - Designed specifically for the removal of emulsified oils, raw petroleum hydrocarbons, grease, and oily coated solids from industrial cleaner systems.

PROCESS TANK – (PT) Where heavy separated oils are collected.

PRIMARY COALESCER - The primary coalescing media is a honeycomb material located inside the Process Tank. Initial coalescing of larger micron oil particles occurs in this region.

PERMEATE RETURN PIPING – Returns cleaned solution back to the cleaner tank.

## 9 Wear Parts List Information

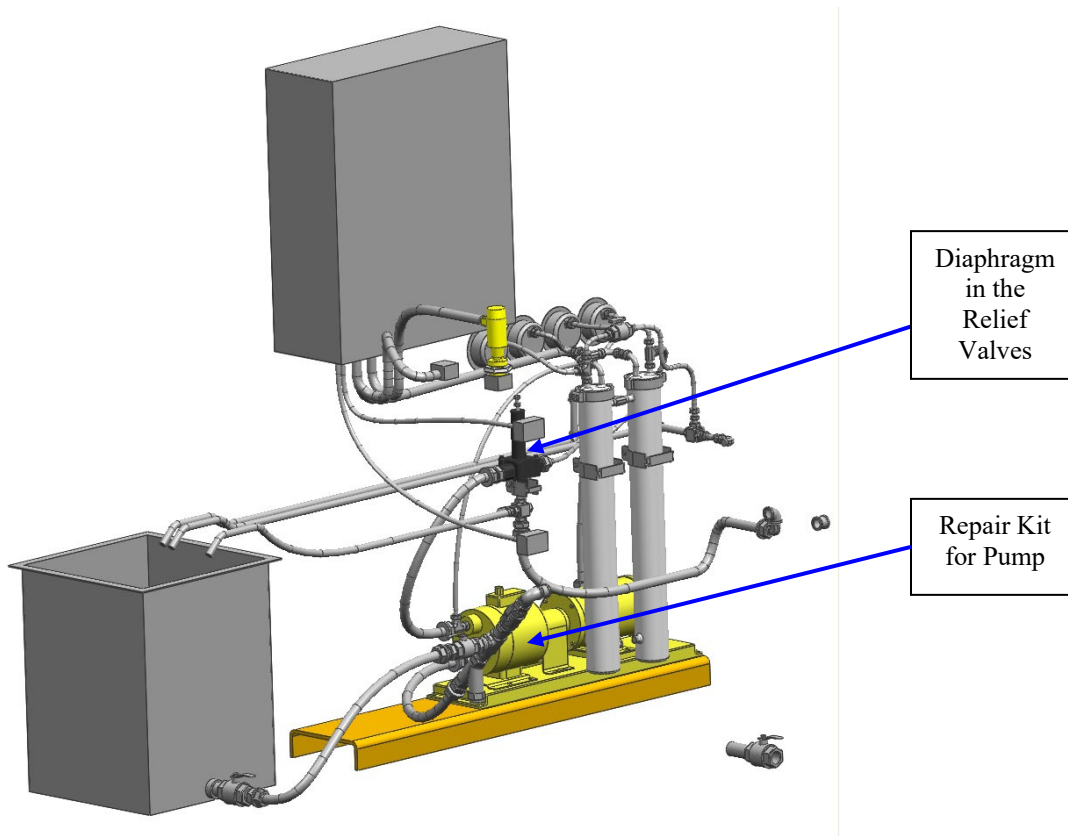
Wear parts only.

**NOTE:** A complete list of system parts can be obtained from Clear Solutions. This list contains all non-wear related parts on the SEPARADE-R unit.

RELIEF VALVE ~ D-001 Contains an “O” ring and Diaphragm.

PUMP REPAIR KIT ~ D-002 Contains the wear parts located in the pump.

## SEPARADE-R CLEANER RECYCLING SYSTEM



### 10 Operational Warnings

- Machine damage may occur if the permeate back pressure exceeds 145 PSIG during operation
- Never operate the unit with the concentrate return or permeate lines blocked. Severe damage and possible injury may occur.



## SEPARADE-R CLEANER RECYCLING SYSTEM

### 12 WARRANTY

Clear Solutions a Division of Benchmark, Inc. warrant products of its own manufacture will be free from defects in raw materials and manufacture under normal use and service for a period of not more than one year after date of shipment. Clear Solution's obligation under this warranty is limited to repair or replacement of its products which shall be returned to Clear Solution's headquarters, Wyandotte, Michigan, USA with all transportation and associated charges prepaid, and which examination shall disclose to Clear Solution's satisfaction to have been thus defective at time of shipment. Provided that Clear Solutions had received immediate written notice upon discovery of such alleged defect and the alleged defective products shall have been returned to Clear Solutions not later than 30 days after Clear Solutions has issued a Return Authorization Number. This warranty shall not apply to any of the products which shall have been used other than for their intended use, nor to any of the products, the composition of which shall have been changed in any way, nor any of the products which have been subject to adverse storage conditions, misuse, negligence or accident.





## **SEPARADE-R CLEANER RECYCLING SYSTEM**

Clear Solutions shall not be held liable for damages or delays caused by defective raw materials and manufacture, nor shall Clear Solutions be liable for consequential damages in cases of failure to meet conditions of warranty. The full liability of Clear Solutions under this clause is the repair or replacement of defective parts, at its discretion.

The customer is responsible for the proper installation and operation of the equipment. A factory representative is available at start-up at cost of travel expenses plus charge per diem.

Products such as filter cartridges do not normally last one year and may require frequent replacement. In addition, certain components such as mechanical seals, springs, "O"-rings, hose, ceramic liners, impeller magnet assemblies, diaphragms, etc. may be subject to wear and, therefore, wear should not be construed as evidence of the existence of a defect, and as such will not be honored in a warranty claim, nor should it be inferred that items such as these will last a year without occasional, or even frequent, replacement depending on the severity of the application. Items not of Clear Solution's manufacture, such as, motors, carry similar warranties by the manufacturer, and can often be serviced through local authorized repair centers or be handled through our office.

**THIS EXPRESS WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES. ALL OTHER WARRANTIES AND, SPECIFICALLY THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSES, ARE EXCLUDED.** No person, agent or representative of Clear Solutions is authorized to give any other warranties on Clear Solution's behalf or to assume for it any other liability in connection with any of these products.

Warning --- Any modification, alteration or other changes to Clear Solution's products will void any warranty and could cause damage or injury to the user of the products.