geotech

Oil Water Separator

Installation and Operation Manual

Rev 6/27/2019 Part # 16500056

Table of Contents

Section 1: System Description 3

System Components 3
Tank 3
Separator Corrosion Protection (For Carbon Steel Only) 3
Lifting Lugs 3
Covers 3
Inlet Compartment 4
Separation Chamber 4
Baffles 4
Sludge Baffle 4
Oil Skimmer 4
Clean Water Chamber 4

Section 2: System Installation 5

Receiving 5
Inspection 5
Off Loading 5
Coating 5
Storage 5
Installation 5
For Equipment Subject to Traffic Loads 5
Leveling 6
Plumbing 6
Quality Assurance 7
Inspection 7
Pre-Test Procedures 7
Tests 7
Test for Contaminants 7
Analytical Methods 8

Section 3: System Operation 9

Separator Start-up 9
Initial start-up 9
Normal operation 10

Section 4: System Maintenance 10

Section 5: System Troubleshooting 12

Trouble Shooting Guideline 12

Section 7: System Schematics 13

Section 8: Parts and Accessories 16

The Warranty 21

DOCUMENTATION CONVENTIONS

This uses the following conventions to present information:

WARNING

An exclamation point icon indicates a **WARNING** of a situation or condition that could lead to personal injury or death. You should not proceed until you read and thoroughly understand the **WARNING** message.

CAUTION

A raised hand icon indicates **CAUTION** information that relates to a situation or condition that could lead to equipment malfunction or damage. You should not proceed until you read and thoroughly understand the **CAUTION** message.

NOTE

A note icon indicates **NOTE** information. Notes provide additional or supplementary information about an activity or concept.

Section 1: System Description

Geotech Oil Water Separator (OWS) removes all free and dispersed non-emulsified oil, and settleable solids. The system operates at a flow rate of 10 GPM (37.85 LPM) at 55°F (12.78°C). The design utilizes the difference in specific gravity between oil and water (buoyancy force). The separator receives oily water by gravity/pumped flow that will not mechanically emulsify the oil and processes it on a “once through” basis through 2 cubic feet of HD Q-PAC coalescing plates. The stainless steel tank is a single wall, rectangular unit installed above grade. The HD Q-PAC coalescing plates are manufactured using a UV-Resistant Polypropylene material.

The Oil Water Separator is a special purpose prefabricated parallel corrugated plate, rectangular, gravity displacement type, oil water separator. The separator is comprised of a tank containing an inlet compartment, separation chamber, sludge chamber, and clean water outlet chamber.

System Components

Tank

The tank is a single wall construction made of 12-gauge stainless steel conforming to ASTM A240, type 304 stainless steel. Welding will be in accordance with AWS D1.1 to provide a watertight tank that will not warp or deform under load. Pipe connections to the exterior shall be as follows:

- All connections 3” (7.62 cm) and smaller are FNPT couplings.
- All connections 4“(10.16 cm) and larger are flat face flanges with ANSI 150 pound standard bolt circle.
- Use flanged piping connections that conform to ANSI B16.5.

Separator Corrosion Protection (For Carbon Steel Only)

After hydrostatic testing has been completed at the manufacturer, special coatings are applied to the interior and exterior surfaces of the Oil Water Separator.

- Interior and exterior shall be sandblasted to SSPC-SP10 & SSPC-SP6
- Interior lined with Tnemec Series 61 liner to 9 mils MDFT
- Exterior coated with polyamide epoxy to 6 mils MDFT.

Lifting Lugs

The tank is provided with properly sized lifting lugs for handling and installation.

Covers

The tank is provided with vapor tight covers for vapor control. Gas vents and suitable access openings to each compartment are also provided. The covers are constructed of marine grade aluminum and fastened in place. A gasket is provided for vapor tightness. 3/8-16 bolts and threaded knobs are provided for cover attachment.

Inlet Compartment

The inlet chamber is comprised of a non-clog diffuser to distribute the flow across the width of the separation chamber. Based on site needs, the inlet compartment will have enough volume to effectively reduce influent suspended solids, dissipate energy, and begin separation. The optional media will sit elevated on top of a sludge baffle. The sludge baffle is provided to retain settleable solids and sediment from entering the separation chamber.

Separation Chamber

The oil separation chamber contains HD Q-PAC Coalescing Media containing a minimum of 132 square feet per cubic foot of effective coalescing surface area. The medias needle like elements (plates) shall be at 90 degrees to the horizontal or longitudinal axis of the separator. Spacing between these elements shall be spaced 3/16” apart for the removal of a minimum of 99.9% of free droplets 20 micron in size or greater. The elements are positioned to create an angle of repose of 90 degrees to facilitate the removal of solids that may tend to build up on the coalescing surfaces, which would increase velocities to the point of discharging an unacceptable effluent. Laminar flow with a Reynolds Number of less than 500 at a maximum designed flow rate shall be maintained throughout the separator packed bed including entrance and exit so as to prevent re-entrainment of oils with water. Flow through the polypropylene coalescing media shall be crossflow perpendicular to the vertical media elements such that all 132 square feet/cubic foot of coalescing media is available for contact with the coalescing surfaces. None of the coalescing media surfaces shall be pointing upward so as not to be available for contact with the crossflowing oily water. The media shall have a minimum of 87% void volume to facilitate sludge and dirt particles as they fall off the vertical elements and settle in the sludge compartment. The media when installed in crossflow OWS shall meet US EPA Method 413.2 and also European Standard 858-1.

Baffles

An oil retention & underflow weir, and overflow weir. Position underflow weir to prevent resuspension of settled solids.

Sludge Baffle

The sludge baffle is located prior to the coalescing compartment for the settling of any solids. The sludge baffle prevents any solids from entering the clean water chamber.

Oil Skimmer

The oil separation chamber is provided with a rotatable pipe skimmer for gravity decanting of the separated oil to a product storage tank.

Clean Water Chamber

The tank has a 60-gallon clean water chamber which allows the water to leave the separator by pumped flow through the clean water outlet port. The 2" (5 cm) vents allow vent piping to atmosphere.

Section 2: System Installation

Receiving

Inspection

Inspect the oil water separator upon delivery for any damage, which may have occurred in shipment. Areas most susceptible to damage are connections and cover openings. If the separator is damaged, notify Geotech immediately. The off-loading personnel should note the extent of damage and sign and date the bill of lading. A claim should be filed with the delivering carrier.

Off Loading

The separator must be carefully removed from the truck so the unit is not damaged. Components for the separator are often supplied in a separate carton. Proper rigging practices should be observed at all times. Hoisting equipment operators should attach a guide line to prevent the separator from swinging out of control. Do not drop the separator or allow it to fall hard in the process of inverting, turning, or moving. Do not slide the separator.

Coating

All damaged coatings should be touched up immediately. Please contact Geotech if more specific information is required. Under no conditions should chains or cables be put around the separator. Use spreader bars, and the lifting eyes on the unit.

Storage

If the equipment is not to be installed at the time of delivery, it should be stored in an area away from traffic. The ground should be level and free sharp objects that might damage the coatings. All equipment should be stored off the ground on timbers. All factory packing should remain intact until the unit is ready for installation. Equipment should be stored indoors. If not, care should be taken that tanks do not fill up with water and debris. Covering all of the equipment with a tarp is strongly recommended.

Installation

When placing the separator for system operation, be sure it is installed in a concrete foundation, which provides adequate support under full load operating conditions. Even if a mounting skid is used, a concrete pad or other properly designed structure must be installed as a foundation. The length and width of this pad are dependent upon the footprint of the unit. Thickness of the concrete pad depends on local soil and frost conditions. A local qualified civil engineer should be contacted to determine these dimensions.

For Equipment Subject to Traffic Loads

1. A concrete slab must be installed around the equipment if the separator is going to be subject to traffic loads.

- It should be designed to carry the load and transmit the load into adjacent, undisturbed soil, not onto the tank sidewalls.

2. If a concrete pad is not installed and the equipment is subject to traffic loads, deformation or in some cases total collapse of the equipment may occur.
   - Geotech cannot be held responsible for equipment subjected to such loads.

Leveling

1. At this point, the equipment should be set exactly in place and the anchor bolts installed.

2. Remove any lids.

3. The tankage should now be made as level as possible.
   - The absolute minimum requirements being, within +/- 1/16“ per foot from inlet to outlet end of tank and +/- 1/16” per foot from side to side, maximum of +/- 1/4“ total.
   - Shim the tank, if necessary, until these parameters are met.
   - We recommend the use of stainless steel shim stock.
   - When installing shims, make sure to locate them under all vertical tank supports.

We cannot stress enough the leveling process. It is better to invest a little time at this point than to try to correct an improperly leveled tank later. A level installation functions better, has a better appearance and will give you fewer problems in the future.

The next step toward system start involves the plumbing and electrical connections. Any valves and/or piping should be adequately supported and accepted piping and valve practices must be followed for proper system operation. Any pump or level probe wiring and conduit connections should be made at this time. If the unit includes internal level detection, insert the level detection probe into the port indicated on the drawing. Be sure to lower the probe to the correct level indicated on the drawing.

Plumbing

1. When making connections to the equipment do not use the equipment as a pipe support.
   - All plumbing should stand on its own if disconnected from equipment.
   - Geotech cannot be held responsible for damage caused by using this equipment to support plumbing.

2. Connections do not have to be made in the order listed below.
   - Review your situation and make the connections in the most convenient order for your particular application.

3. Connect the outlet plumbing.
   - The effluent plumbing must be the same size or larger than the nozzle size of the equipment.
   - Do not reduce the size of the effluent piping as this might cause hydraulic overloading of the equipment.

- Try to run the discharge piping through as few changes as possible, as short a distance as possible, and at a pitch of not less than 1/16” per foot.
- On gravity flow units, it may be necessary to vent exterior piping to prevent air locks in discharge pipe.

4. Connect the inlet plumbing.
   - The influent must be the same size or smaller than the nozzle size on the equipment.
   - Do not increase the size of the influent piping as this might cause hydraulic overloading of the equipment.
   - The pitch of the pipe should not exceed 1/16" per foot.

5. On most units, vents are provided.
   - These vents have been supplied to prevent air locks during surge conditions.
   - For both indoor and outdoor applications, the vents should run to a location where noxious and sometimes volatile gas would pose no hazard.
   - Follow all applicable fire codes concerning size of vent pipe.

Do not plug or otherwise obstruct airflow through the vents. Obstructing airflow through the vents could damage the unit and/or create a hazardous condition.

Quality Assurance

Inspection

Examine each component of the separator for compliance with requirements. This element of inspection can encompass visual examination.

Pre-Test Procedures

After separator has been leveled, hydrostatically test unit for 4 hours by filling the tank with potable water until full, provided by customer, with means of getting it from the nearest source by the installer. Acceptance criteria for this test is no leakage after 4 hours.

Tests

After hydrostatic test has been successfully completed and unit has been properly connected to influent and effluent piping, allow influent oil water mixture of 100 ppm, to flow into separator filled with potable water. After injection, operate unit for a minimum of ten tank volume changes prior to testing for contaminant removal.

Test for Contaminants

The installer shall test the effluent to ensure that it meets oil concentration levels. Test must be performed by an independent certified testing laboratory.

Analytical Methods

Test and sample preservation methods for test contaminants shall be in accordance with the latest revision of EPA Methods for Chemical Analysis of Water and Wastes. Effluent oil concentration shall be measured by gravimetric, Separatory Funnel Extraction Method API 413.1.

- The separator should be checked periodically to determine if excessive amounts of solids and debris have accumulated.
- If this happens the solids may accumulate enough to plug the lower part of the HD Q-PAC plates.
- In this case, efficiency will be reduced and oil in the outlet water may exceed specified effluent limits.
- See *Section 4: System Maintenance* for cleaning instructions.

Section 3: System Operation

The inlet flow to the separator must be by gravity or a positive displacement pump upstream. Centrifugal pumps greatly agitate the oil and water and tend to make a stable emulsion that is very difficult, if not impossible, to separate by gravity settling.

Separator flow should be controlled upstream to ensure even, steady flow, and stable conditions in the separator. Unstable flows tend to reduce efficiency and may cause high oil concentration at the outlet.

The separator tank is atmospheric in design and must be vented to the atmosphere. Consult the OWS drawing for location of all vents.

To achieve the desired flow, excessive throttling of the input must be avoided as this will also cause emulsification of the oil, adversely effecting separator performance. Especially avoid the use of globe type or other valves with high-pressure drops.

It is recommended that the effluent water flows by gravity flow from the separator. The pressure loss for the water effluent pipe should not exceed the drop elevation of the customer lines. External piping should be separately supported. The separator is not designed to support piping.

To install the separator, follow these steps: (Please refer to installation drawing)

1. Ensure that the source of the water to be treated is properly regulated and not provided with a centrifugal pump or other device, which will cause emulsification such as a high-pressure drop valve.

2. Ensure that the separator is securely installed per installation drawing.

Separator Start-up

Initial start-up

This procedure is to be followed after the installation of the separator or after the separator has been drained for maintenance and is ready to be restarted.

1. Ensure that the owner supplied upstream influent flow regulating valve is closed.

2. Before starting the flow to the unit, remove the coalescer access cover and ensure that the HD Q-PAC packs have not shifted and are securely fastened.
   - The separator should contain plate packs, polishing pack, and adjustable oil skimmer pipe tube.
   - **Slot of skimmer must be turned upward away from water.**

3. Ensure that there are not obstructions in the water outlet piping.

4. With the coalescer access cover off, **fill the tank with clean water**, establishing flow from the effluent opening.

- **Separator performance depends on buoyancy effect of clean water, if there is no clean water in the separator, your separator <u>will not work</u>.**
- Check for leaks, both external and internal, and repair any that are found.

5. Allow the influent oil water mixture into the OWS tank.

6. Replace the coalescer access cover and bolt down tight.

Normal operation

Carefully maintain flow at the rate set when flow was established. Once a sufficient quantity of oil has accumulated in the separator, turn the slot of the skimmer into the oil layer. The oil will then be transferred into an integral oil storage compartment or to a separate tank outside of the separator. Disposal of the oil must comply with regulations of the authority having jurisdiction.

Figure 3-1a: Detail of PVC Pipe Simmer

Figure 3-1b: Detail of adjustable overflow weir plate

Section 4: System Maintenance

After the first 6 months of operation, the inlet area should be inspected and cleaned as follows:

1. Stop the flow of influent to the separator.
2. Remove separator cover.
3. Dispose of separated oil per regulatory procedures.
4. Remove water from separator through drain or hose.

Measure and record the depth of the solids. Use this measurement as the timing basis for the next solids inspection and clean out. Consult OWS drawing for depth of sludge baffle. Solids should not exceed this depth.

The HD Q-PAC plates can be either cleaned in place or removed and cleaned.

1. For cleaning in place, connect a pressure water hose (1-15 psig) and insert in plate spacing on top of the plate packs.
    - As the water flushes the dirt out of the plate packs it should be removed by the vacuum hose.

2. For removing plate packs outside of separator.
    - Flush with garden hose (10-15 psig) over an area to prevent discharge of flushed water into groundwater.
    - Remove all sludge from between the plates and any very heavy oil coating.

Examine tank interior for damage and repair any damage to internal coating.

To restart separator, reinstall HD Q-PAC plate packs and polishing pack in original position. Make sure that both are securely in place so that they do not float when unit is operational.

For startup, repeat steps in *Section 3: System Operation.*

Section 5: System Troubleshooting

Regularly monitor the quality of the effluent leaving the separator. If any loss in effluent quality is observed, steps should be taken to correct the problem immediately. Some things to check if effluent quality has deteriorated are:

- Have you exceeded the separators rated flow? If so, return the flow rate to the design flow rate.

- Have you allowed the sludge to accumulate to a point where it has started to affect the performance of the separator? If so, take steps to have the sludge removed immediately. If it cannot be pumped out, you will have to drain the separator and remove the accumulated sludge.

- Check the influent for surfactants or chemical emulsifiers. If any are present, you may need additional treatment in order to meet discharge requirements.

- Are you pumping into the separator? If so, you may be mechanically emulsifying the influent oil. Sample the oil water from both before and after the pump. There should be no differences between the two samples. If you are mechanically emulsifying the oil you may have to change your influent pump to a low RPM positive displacement pump or similar pump that will cut down on shearing.

- Check to make sure that the oil depth in the separator is not too great, a deep layer of product will reduce the efficiency of the separator. Free product should be removed and the separator put back in service.

Trouble Shooting Guideline

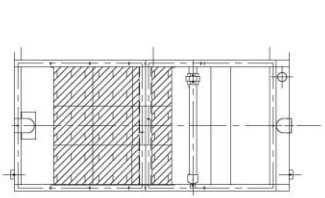
PROBLEM	POSSIBLE CAUSE	DIAGNOSTIC TECHNIQUE	CORRECTIVE ACTION
Effluent Concentration too high	Oil Concentration too great for design.	Sample influent.	Decrease the flow rate.
	Flow too great for design.	Check flow.	Decrease the flow rate.
	Plates are blocked.	Inspect. Remove plates if necessary.	Clean per *Section 4: System Maintenance* and reinstall.
	Solids have accumulated into coalescer plates.	Check depth of solids in coalesce compartment.	Remove solids from compartment. See *Section 4: System Maintenance.*
Tank is overflowing	Output line restricted.	Check flow.	Remove Restriction.

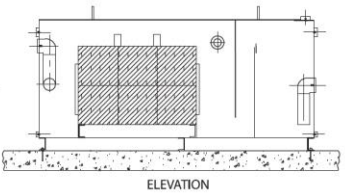
For proper operation, outlet line should be as large as outlet nozzle unless unit is to be operated at very large flows.

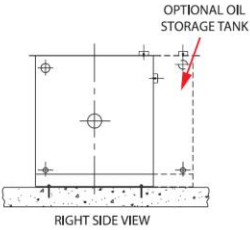
Section 6: System Schematics

AG Model Specifications

Model	Flow Rate (GPM)	Diameter	Width	Length	Height	Capacity (GAL)
AGS Series						
AGS-1	2-6	2”	16”	48”	28”	60
AGS-2	3-11	2”	28”	48”	28”	120
AGS-3	5-20	2”	40”	48”	28”	180
AGM Series						
AGM-2	6-22	2”	28”	60”	28”	150
AGM-3	9-33	2”	40”	60”	28”	225
AGM-2-1H	12-40	2”	28”	60”	40”	175
AGM-3-1H	18-60	2”	40”	60”	40”	258
AG Series						
AG-2	50	3”	28”	72”	40”	269
AG-3	75	3”	40”	72”	40”	403
AG-4	100	4”	52”	72”	40”	718
AG-4-1H	150	4”	52”	84”	52”	837

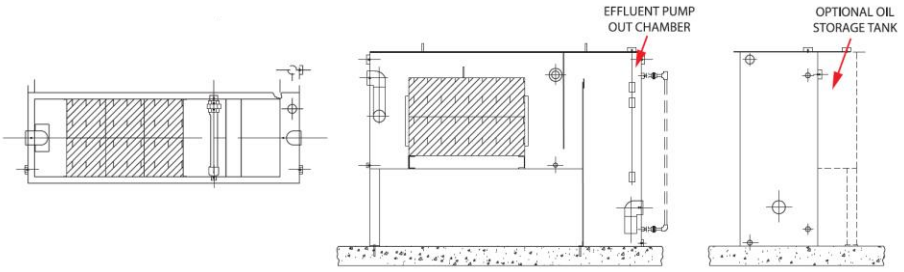




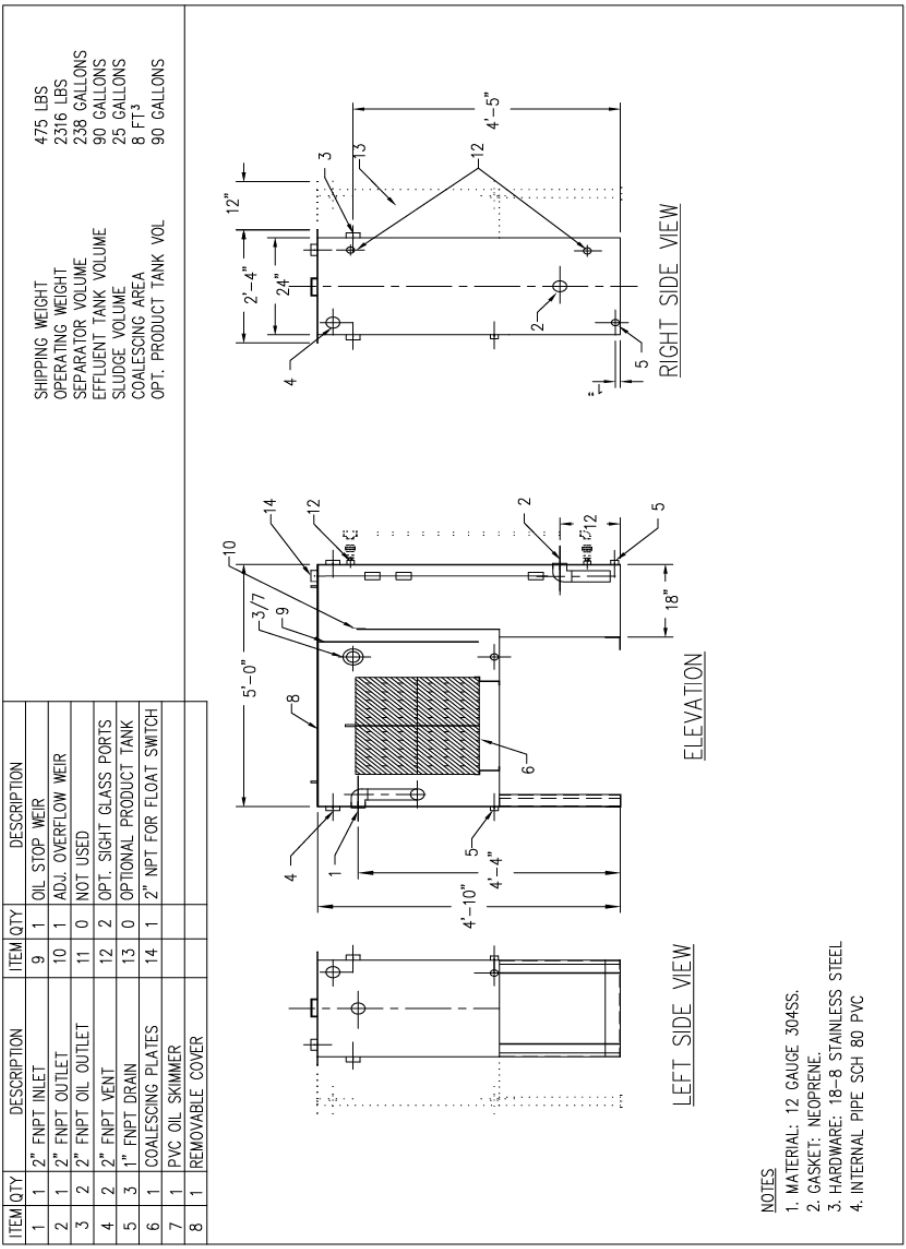


AG Model with Effluent Pump Put Chamber Specifications

Model	Flow Rate (GPM)	Diameter	Width	Length	Height	Capacity (GAL)	Clean Water Chamber Capacity
AGS Series							
AGS-1SS-30V	2-6	2”	16”	48”	48”	75	30
AGS-2SS-60V	3-11	2”	28”	48”	48”	174	60
AGS-3SS-90V	5-20	2”	40”	48”	48”	270	90
AGM Series							
AGM-2SS-60V	6-22	2”	28”	60”	48”	210	60
AGM-3SS-90V	9-33	2”	40”	60”	48”	279	90
AGM-2SS-90V-1H	12-40	2”	28”	60”	58”	217	90
AGM-3SS-150V-1H	18-60	2”	40”	60”	58”	325	150
AG Series							
AG-2	50	3”	28”	72”	56”	419	150
AG-3	75	3”	40”	72”	56”	628	225
AG-4	100	4”	52”	72”	56”	1018	300
AG-4-1H	150	4”	52”	84”	72”	1287	450



Section 7: System Schematics



Section 8: Parts and Accessories

Part Description	Part Number
Base Oil/Water Separator	
OWS,FLAT BOTTOM,2-5 GPM	86500100
OWS,FLAT BOTTOM,3-10 GPM	86500101
OWS,FLAT BOTTOM,5-15 GPM	86500102
OWS,FLAT BOTTOM,6-20 GPM	86500103
OWS,FLAT BOTTOM,9-30 GPM	86500104
OWS,FLAT BOTTOM,12-40 GPM	86500105
OWS,FLAT BOTTOM,18-60 GPM	86500106
OWS,FLAT BOTTOM,18-60 GPM	86500107
OWS,FLAT BOTTOM,27-90 GPM	86500108
OWS,FLAT BOTTOM,36-120 GPM	86500109
OWS FLAT BOTTOM,60-170 GPM	86500110
Sump	
SUMP,30 GALLON,AGS-1SS	56500100
SUMP,60 GALLON,AGS-2SS	56500101
SUMP,90 GALLON,AGS-3SS	56500102
SUMP,60 GALLON,AGM-2SS	56500103
SUMP,90 GALLON,AGM-3SS	56500104
SUMP,90 GALLON,AGM-2SS-1H	56500105
SUMP,150 GALLON,AGM-3SS-1H	56500106
SUMP,75 GALLON,AG-2SS	56500107
SUMP,150 GALLON,AG-3SS	56500108
SUMP,150 GALLON,AG-4SS	56500109
SUMP,300 GALLON,AG-4SS-1H	56500110
Sledge Hopper	
SLUDGE HOPPER,AGS-1SS	56500111
SLUDGE HOPPER,AGS-2SS	56500112
SLUDGE HOPPER,AGS-3SS	56500113
SLUDGE HOPPER,AGM-2SS	56500114
SLUDGE HOPPER,AGM-3SS	56500115
SLUDGE HOPPER,AGM-2SS-HP-1H	56500116
SLUDGE HOPPER,AGM-3SS-HP-1H	56500117
SLUDGE HOPPER,AG-2SS-HP	56500118
SLUDGE HOPPER,AG-3SS-HP	56500119
SLUDGE HOPPER,AG-4SS-HP	56500120
SLUDGE HOPPER,AG-4SS-HP-A1	56500121
Product Tank	
PRODUCT TANK,40 GALLON	56500122
PRODUCT TANK,60 GALLON	56500123
PRODUCT TANK,90 GALLON	56500124
PRODUCT TANK,120 GALLON	56500125
PRODUCT TANK,40 GALLON	56500122
Accessories	
ASSY,TRANSFER,PUMP,.5HP,EP	1182001

SIGHT TUBE ASSY,1,2,3'	2100037
PRB-SUMP DENS:HI-LO W/HI	2941658-02
COALESCING MEDIA,SS,3/4",18FT3	16500100
TANKFULL PROBE,25',NO CONN	2390073

Revision History		
Project #	**Description**	**Date**
1661	Manual release – StellaR	6/27/2019

NOTES

NOTES

The Warranty

For a period of one (1) year from date of first sale, product is warranted to be free from defects in materials and workmanship. Geotech agrees to repair or replace, at Geotech's option, the portion proving defective, or at our option to refund the purchase price thereof. Geotech will have no warranty obligation if the product is subjected to abnormal operating conditions, accident, abuse, misuse, unauthorized modification, alteration, repair, or replacement of wear parts. User assumes all other risk, if any, including the risk of injury, loss, or damage, direct or consequential, arising out of the use, misuse, or inability to use this product. User agrees to use, maintain and install product in accordance with recommendations and instructions. User is responsible for transportation charges connected to the repair or replacement of product under this warranty.

Equipment Return Policy

A Return Material Authorization number (RMA #) is required prior to return of any equipment to our facilities, please call our 800 number for appropriate location. An RMA # will be issued upon receipt of your request to return equipment, which should include reasons for the return. Your return shipment to us must have this RMA # clearly marked on the outside of the package. Proof of date of purchase is required for processing of all warranty requests.

This policy applies to both equipment sales and repair orders.

FOR A RETURN MATERIAL AUTHORIZATION, PLEASE CALL OUR SERVICE DEPARTMENT AT 1-800-833-7958.

Model Number: _____

Serial Number: _____

Date of Purchase: _____

Equipment Decontamination

Prior to return, all equipment must be thoroughly cleaned and decontaminated. Please make note on RMA form, the use of equipment, contaminants equipment was exposed to, and decontamination solutions/methods used. Geotech reserves the right to refuse any equipment not properly decontaminated. Geotech may also choose to decontaminate the equipment for a fee, which will be applied to the repair order invoice.

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