

CLEAR INSTALLATION AND STARTUP GUIDE REV. B



REFER TO OPERATING MANUAL FOR IMPORTANT SAFETY INFORMATION

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GENERAL INFORMATION

Read instructions thoroughly prior to assembly and installation. **All Clear products are factory adjusted for optimal nanobubble production. Do not adjust factory setpoints.**

LOCATION REQUIREMENTS

Carefully select the Clear installation location based on the requirements specified in this section. Locate the Clear as close to the waterbody as possible in a 5 ft x 5 ft (1.5 m x 1.5 m) open area of level ground. Use the guidelines shown in Figures 1 and 2 to locate the intake structure. Ensure that the intake structure location is free of weeds and debris. Do not locate the intake structure in an area where leaves or other floatable debris tend to accumulate. Where possible, locate the intake structure several feet (a couple of meters) from shore.

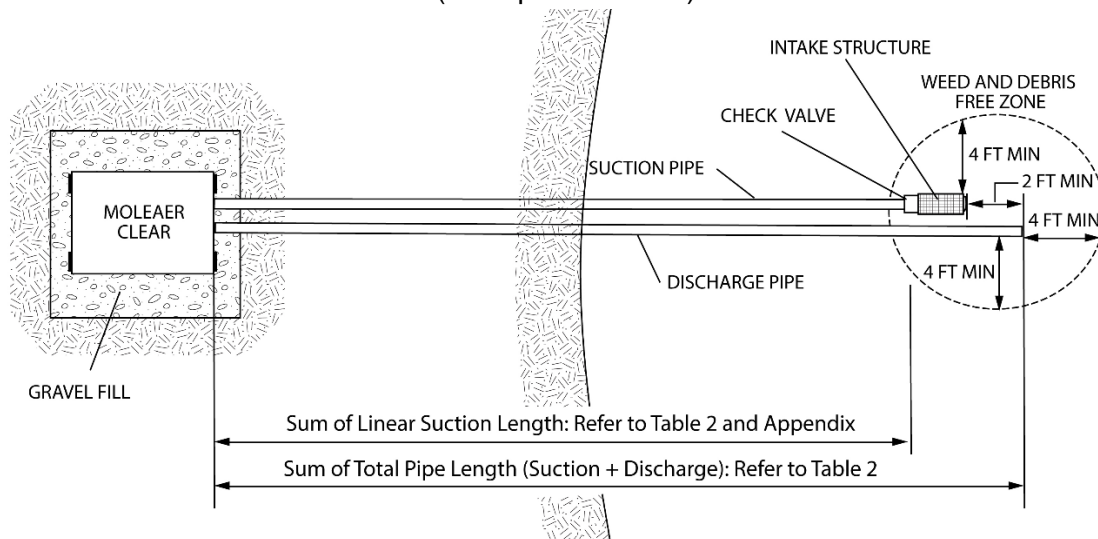


Figure 1: Plan View of Clear Suction and Discharge Pipe Installation

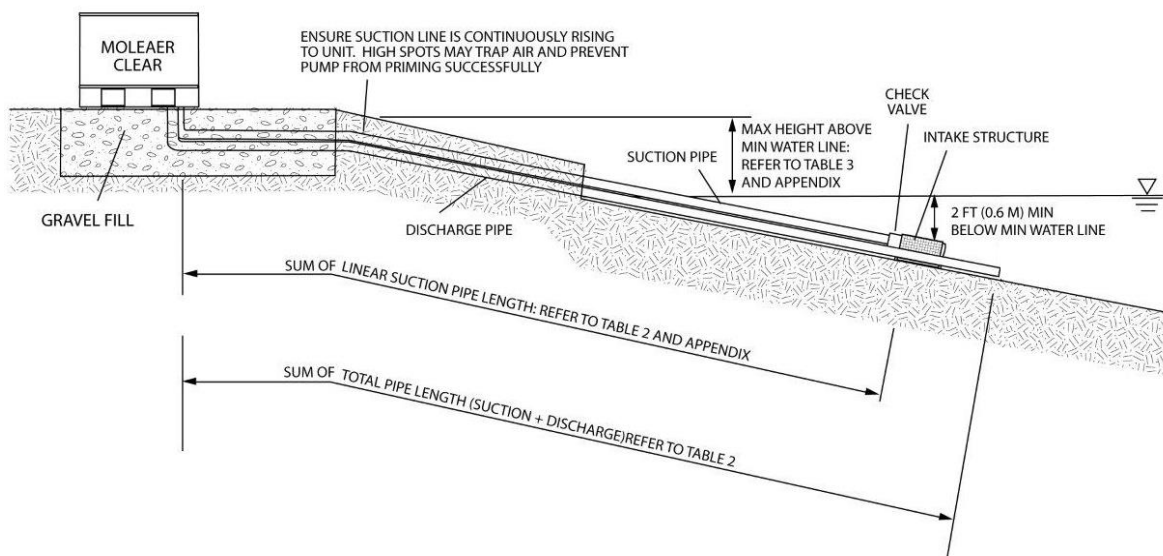


Figure 2: Section View of Clear Suction and Discharge Pipe Installation

For Clear power input, suction and discharge pipe, and installation elevation requirements refer to Tables 1, 2, and 3, respectively. Tables are divided by pump type, if applicable.



Failure to install the Clear within the limits specified in Tables 1, 2 and 3 may void the system warranty and result in poor nanobubble production and pump cavitation.

Table 1. Power Input Requirements

	Clear 50*	Clear 150*
60 Hz (North America)	Single Phase, 115 V or 220-240 V	Single Phase, 220-240 V
50 Hz	Single Phase, 220-240 V	Single Phase, 220-240 V

*Check pump nameplate to verify power input requirements.

Table 2. Suction and Discharge Pipe Requirements

	Clear 50	Clear 150
Nominal Pipe Size	2 in (63 mm)	3 in (90 mm)
Equipped Pump Brand:	Pentair Sparus 160	
Maximum Suction Pipe Length	350 linear ft (106.7 linear m)	250 linear ft (76.2 linear m)
Maximum Total Pipe Length (Suction + Discharge)	700 linear ft (213.4 linear m)	500 linear ft (152.4 linear m)
Equipped Pump Brand:	DAB ESWIM	
Maximum Suction Pipe Length	400 linear ft (122.0 linear m)	400 linear ft (122.0 linear m)
Maximum Total Pipe Length (Suction + Discharge)	800 linear ft (243.9 linear m)	800 linear ft (243.9 linear m)

Table 3. Installation Elevation Requirements

	Clear 50	Clear 150
Equipped Pump Brand:	Pentair Sparus 160	
Recommended Suction Lift*	13 vertical ft (4 vertical m)	6 vertical ft (1.8 vertical m)
Equipped Pump Brand:	DAB ESWIM	
Recommended Suction Lift*	16 vertical ft (4.9 vertical m)	12 vertical ft (3.7 vertical m)

*Vertical distance between minimum water line of water body and base of Clear.

Pipe lengths and unit elevations can play an important role in the performance of the pump and the unit as a whole. Refer to the Appendix for additional detail regarding the recommended operating envelope for these units.




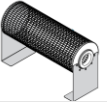
While minimizing the elevation of the unit from the water surface is the key to optimized performance, special measures must be taken to reduce the chances of water ingress into the unit (flooding). For example, if the water level changes throughout the year, the installation elevation must be above the max water level. If the water ingress is unpredictable, use barriers around the unit to reduce the chance of flooding.



PARTS AND ACCESSORIES

The parts and accessories shown in Table 4 are shipped loose with all Clear products.

Table 4. Clear Standard Parts List







Image	Quantity	Clear 50	Clear 150	Part Description
	1	2 in	3 in	Intake Screen with Check Valve
	1	One Size	One Size	Intake Screen Stand

All parts necessary to assemble up to 40 linear feet (12 linear meters), each, of suction and discharge piping are provided with purchase of a Clear Installation Kit. The actual length of pipe required will vary by installation. Additional pipe lengths may be purchased with the Clear in 10-foot (3-meter) increments.

The Clear Installation Kit can only be shipped within the United States and Canada. Refer to Table 5 for the Clear Installation Kit parts list. Clear Installation Kit parts and additional suction and discharge pipe can be purchased at most hardware stores. **For pipe assembly, use only Schedule 40 polyvinyl chloride (PVC) pipe and fittings and Oatey Rain-R-Shine Medium Blue PVC Cement or equivalent PVC cement formulated for wet conditions and fast installation.**

Prior to installation, verify all parts listed in Tables 4 and 5 are present. Not all pipe and fittings provided in the Clear Installation Kit will be required for all installations.

Table 5. Clear Installation Kit Parts List

Clear Installation Kit Parts List				
Image	Quantity	Clear 50	Clear 150	Part Description
	1	8 oz	8 oz	PVC Pipe Primer
	1	8 oz	8 oz	PVC Cement Formulated for Wet Conditions and Fast Installation
	8	2 in NPS x 10 ft Length	3 in NPS x 10 ft Length	Sch 40 PVC Bell-End Pipe
	6	2 in	3 in	Sch 40 PVC Couplings with Socket Ends
	6	2 in	3 in	Sch 40 PVC 45 Street Elbow with Socket Ends
	6	2 in	3 in	Sch 40 PVC 90 Street Elbow with Socket Ends

INSTALLATION GUIDELINES

The unique site conditions for each waterbody should be carefully considered when identifying the Clear installation location. Refer to the Location Requirements section of this guide for addition details.

The guidelines herein are recommended for calm waterbodies with intake structure depths less than 10 ft (3 m). **For deeper water intakes or high current waterbodies, contact a Moleaer sales representative or call (424) 558-3567 prior to purchasing a Clear.**

Upon delivery, unscrew the shipping screws to remove the Clear from the shipping crate. Inspect the Clear for any damage or loose parts that may have occurred during transport. Hand tighten any loose parts.

Installation Parts and Materials

The parts and materials required to install the Clear include:

- A shovel
- 25 cubic feet (0.7 cubic meters) of all-purpose gravel
- PVC saw
- PVC pipe primer and PVC pipe cement
- Clear Installation Kit or installation kit parts listed in Table 5

Pipe Assembly

Completely bury or submerge all PVC pipe and fittings to avoid ultraviolet (UV) degradation. All PVC pipe connections must be solvent welded using PVC cement. Use only Schedule 40 polyvinyl chloride (PVC) pipe and fittings. Use only PVC cement formulated for wet condition and fast installation to connect PVC pipe to PVC fittings. Do not use black, acrylonitrile butadiene styrene (ABS) piping or mix ABS pipe or fittings with PVC pipe or fittings.

All PVC pipe connections must be airtight and leakproof. **Failure to provide airtight suction pipe connections may negatively impact nanobubble generator performance.** Large bubbles visible at the pump strainer basket is an indication of suction pipe leaks. Difficulty with pump priming may also be an indication of suction pipe leaks. Check and correct for all suction and discharge pipe leaks prior to burying or submerging pipe.

Proper technique must be used when gluing PVC pipe and fittings to ensure an airtight, leakproof connection. For proper technique, refer to the Appendix. Allow for proper cure time to lapse before wet testing suction and discharge pipes. Refer to Appendix, Item 8 for cure times.

Clear Installation

The installation diagrams for the Clear are shown in Figures 3 and 4. Using a shovel, dig a hole approximately 5 ft (1.5 m) Long (L) x 5 ft (1.5 m) Wide (W) x 1 ft (0.3 m) Deep (D). The Clear will be installed with the pressure gauges facing away from the waterbody. Near the edge of the hole

that is closest to the waterbody, dig out a portion of the pipe trench that is long and deep enough to hold the first segment of suction and discharge pipe.

Refer to the pipe connections extending from the base of the Clear that are shown in Figure 3. Using PVC primer and cement, glue elbows to the first straight, horizontal pipe segments of suction and discharge piping and lay these pipe segments in the pipe trench with the elbows facing up. Refer to Figure 5 for Clear enclosure dimensions and pipe penetration locations to properly position the elbows.

Using PVC pipe primer and cement, glue a segment of straight pipe long enough to vertically connect the pipe connections at the base of the Clear to the elbows positioned in the hole. Glue one end of the vertical pipe to the suction elbow in the trench and the other end to a coupling. Repeat these steps for the vertical segment of discharge pipe. Do not bury horizontal pipes until the Clear is installed and has passed leak inspection and wet testing.

Once the vertical suction and discharge pipes and first segments of horizontal suction and discharge pipes are glued in position, fill the hole with gravel until the reducing couplers are partially buried. Level the gravel. Verify the reducing couplers are positioned correctly to line up with the pipe connections extending from the base of the Clear.

The pipe connections at the base of the Clear are grooved for factory testing. The grooves will not interfere with the gluing of PVC connections. Using PVC primer and cement, coat the pipe connections at the base of the Clear and the reducing couplers with cement and then place the Clear on the gravel bed, making sure that the pipe connections are aligned with and firmly glued into the coupling.

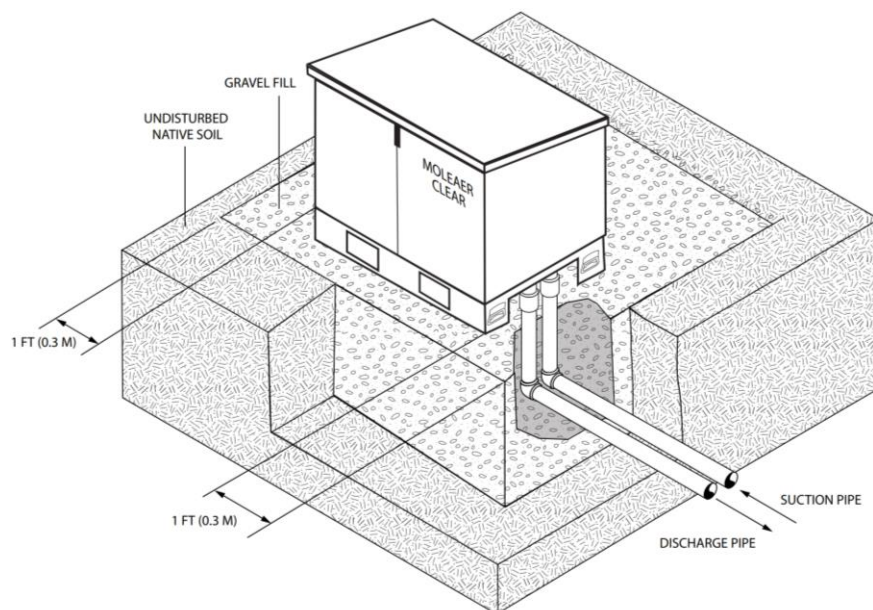


Figure 3: Clear Isometric Installation Diagram

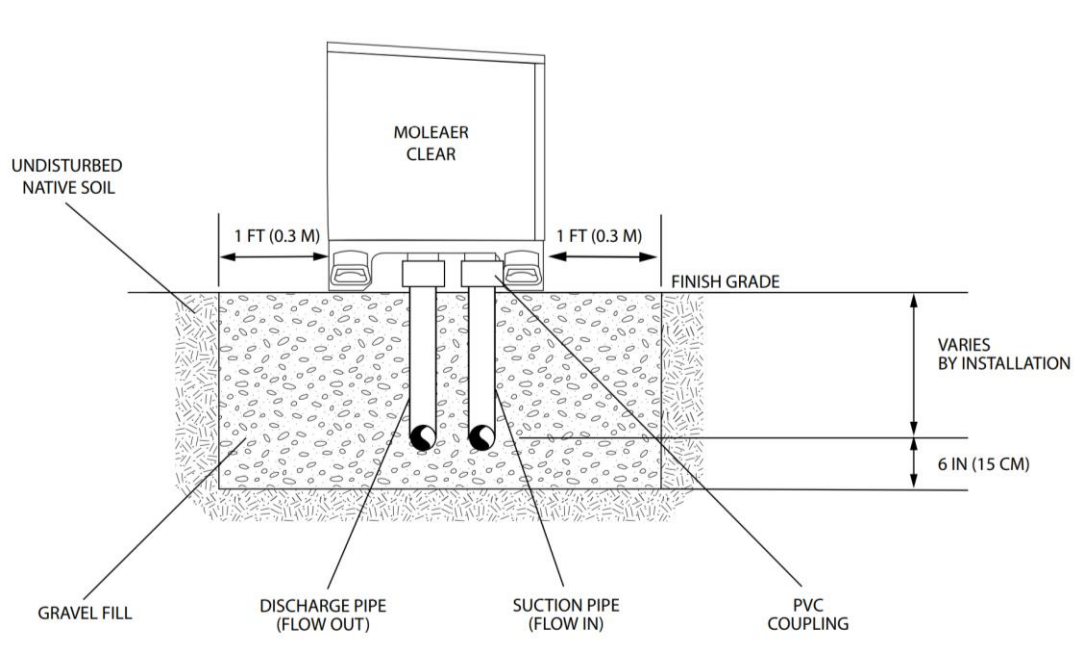


Figure 4: Clear Front Section Installation Diagram

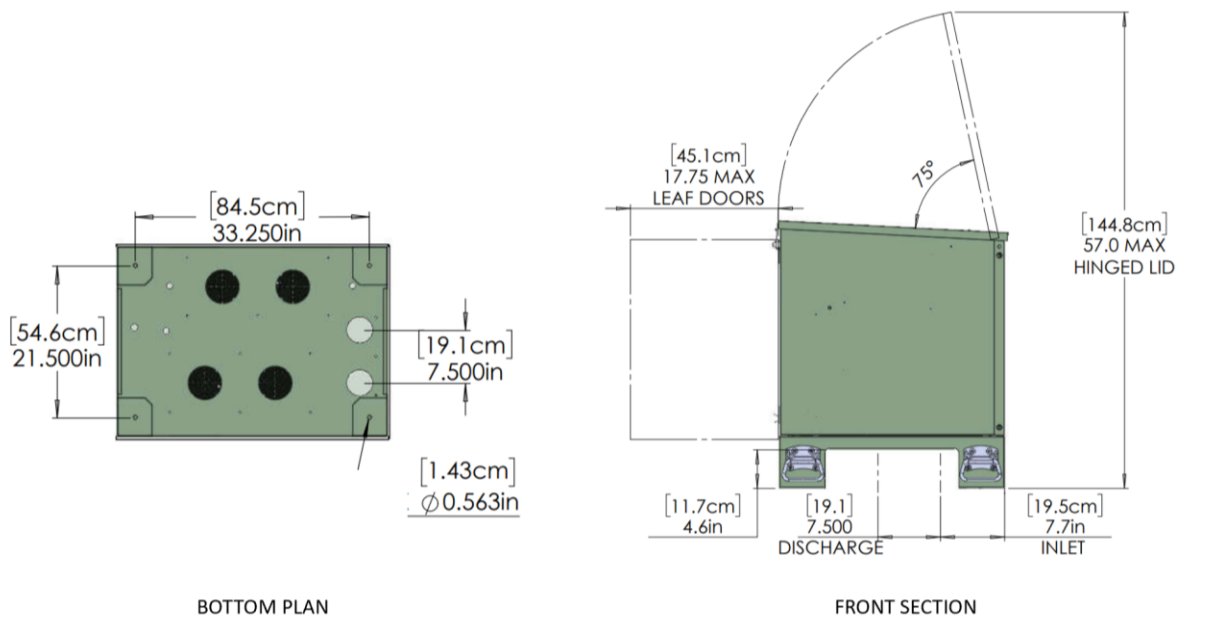


Figure 5: Clear Enclosure Dimensions

Suction Piping and Intake Structure Installation

Locate and install the intake structure and suction pipe following the recommendations detailed in Figures 1, 2, and 6, and in the Appendix. Use available fittings as necessary to route the suction piping from the Clear to the waterbody. Do not remove the bell end of the PVC pipe. The bell end can be used as a coupling for connecting straight pipe segments.

The intake structure consists of the intake screen, check valve, and stand as shown in Table 4. To assemble the intake structure, follow the instructions provided by the intake screen manufacturer.

Ensure that the suction line is continuously rising from the water body to the inlet of the unit. High spots in the suction line may trap air and prevent the pump from self-priming properly.

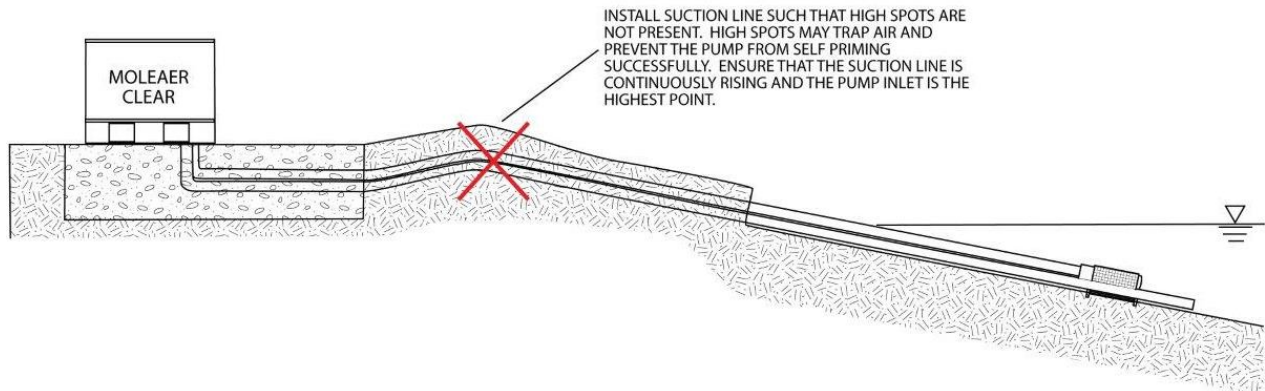


Figure 6: Suction Piping Layout

Water flows through a check valve in only one direction as indicated by the flow arrow on the check valve. The check valve is normally in the closed position and opens in response to the pump drawing suction from the waterbody. Ensure that the check valve is installed with the flow arrow in the direction of suction flow so as not to restrict the flow of water to the pump.



Do not bury suction piping until the system has been wet tested and is free of leaks. Do not wet test until pipe cement cure time has lapsed. Refer to Appendix, Item 8 for recommended cure time.

Discharge Piping Installation

Locate and install the discharge pipe following the recommendations detailed in Figures 1 and 2. Use available fittings as necessary to route the discharge piping from the Clear to the waterbody. Do not remove the bell end of the PVC pipe. The bell end can be used as a coupling for connecting straight pipe segments.



Do not bury discharge piping until the system has been wet tested and is free of leaks. Do not wet test until cure time has lapsed. Refer to Appendix, Item 8 for recommended cure time.

QUICK STARTUP GUIDELINES



Refer to the operating manual for important safety and startup information.

Power Input Instructions



Extension cord use is hazardous and must be avoided.

- Step 1. The Clear requires a dedicated, weather-resistant power receptacle. Prior to plugging the Clear into the power receptacle, perform a voltage drop test to verify proper circuit operation.
- Step 2. When all piping is installed, cure time has been met, and proper circuit operation has been verified, plug the Clear into the dedicated, weather-resistant power receptacle.

Pump Priming Instructions

- Step 1. Open the enclosure of the Clear by lifting the latch hasp to open the lid and double-leaf doors.
- Step 2. Remove the lid from the pump strainer basket by turning it counterclockwise.
- Step 3. Fill the strainer basket with at least 2 gallons of water to prime the pump.*
- Step 4. Attach the pump strainer basket lid by carefully positioning it over the O-ring and turning the lid clockwise.
- Step 5. Turn the Clear on by pushing the start button.
- Step 6. Check that water is flowing through the pump by verifying that the strainer basket is filled with water.

*A hose or bucket can be used to fill the suction line between the check valve and pump for systems that are difficult to prime. Fill the pump basket until the suction line fills completely and begins to fill the pump basket to the top.

Pump priming may take several minutes. If the pump does not prime after several minutes, turn the Clear off, review all suction pipe field connections to ensure airtight connections, re-prime the pump and try again. Wait five minutes before re-priming to allow the pump seals to cool.

Once primed, large bubbles or a large air pocket should not be visible in the strainer basket. If large bubbles or an air pocket is visible in the strainer basket there is a suction pipe leak. Check suction pipe for leaks and ensure all pipe connections are airtight.

Once the pump is primed and suction piping is free of leaks:

- Step 1. Close the double leaf doors and lid.
- Step 2. Start the Clear. The compressor(s) will activate to initiate gas flow after the pump has primed.
- Step 3. Run the system for 10 minutes and then check the intake screen for debris. If debris has accumulated on the intake screen, turn off the pump and clean off the intake screen.
- Step 4. Repeat Steps 1 through 3 above until the intake screen remains free of debris after 10 minutes of continuous operation.

Suction and Discharge Operation

Turn the Clear on and observe the suction and discharge locations in the waterbody. The intake should not create a vortex at the surface. If a vortex is visible, the intake screen is not properly submerged. Verify that the intake screen is resting on the floor of the waterbody and extend the suction pipe as required to position the intake screen in a deeper location of the waterbody. The bubble pattern visible at the surface of the water above the discharge should consist primarily of small bubbles, roughly the size of a pea or smaller. **If bubbles are consistently larger than the size of a pea, contact a Moleaer field service technician at (424) 558-3567.**

Typical Operating Parameter Ranges

The typical operating parameter ranges for the Clear are shown in Table 7.

Table 7. Clear Typical Operating Parameter Ranges

Parameter	Clear 50	Clear 150
Gas Pressure (Gauge)	60 –100 psig	60 –100 psig
Liquid Pressure (Gauge)	8 –15 psig	8 –15 psig
Gas Flow Rate (Rotameter)	0.5 – 3.5 cfh	5 – 18 cfh

If the Clear is consistently operating outside of the ranges shown in Table 7, contact a Moleaer technical service representative at (424) 558-3567.

- End of Section -

Document Revision History

Rev	Description	ECO No.	Assignee	Date Finished
A	Initial release.	-	PM	12/28/2020
B	Updated figures. Added Pump Operating Envelope Appendix. Added Pump Types to Tables 2 and 3.	1201	CL	4/28/2021

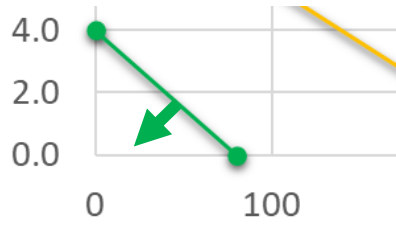
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APPENDIX: RECOMMENDED INSTALLATION/OPERATING ENVELOPE

How to read the graphs:

The y-axis is the elevation of the base of the Clear unit above the waterline.

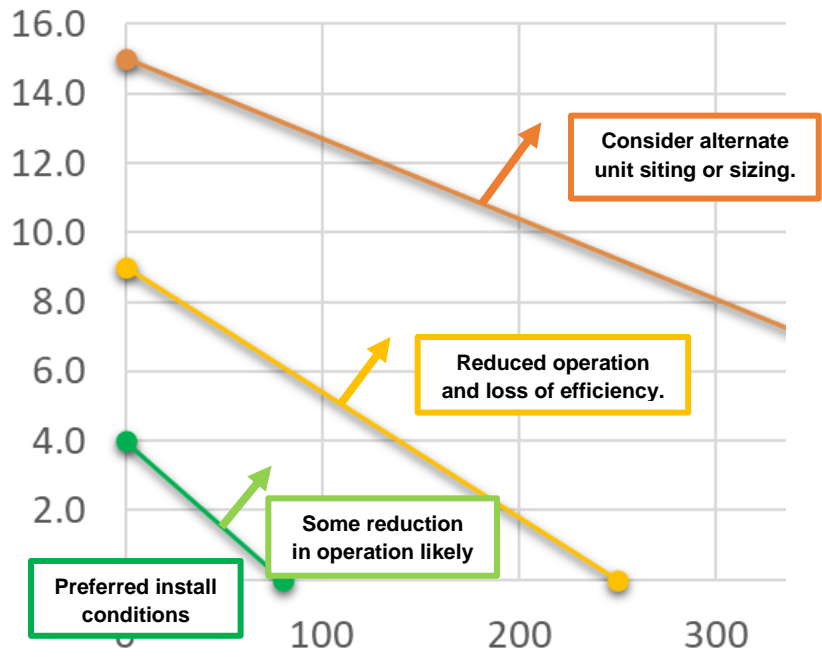
If elevation and suction pipe length are below this line, the pump *should* operate at the given flowrate or better.



Lines are equal to a constant NPSHa

The x-axis is the length of piping in the suction line. Change in the slope of the pipe or the depth below the water's surface are not important, *only the overall length*.

● 150 GPM (24.5 ft NPSHr)

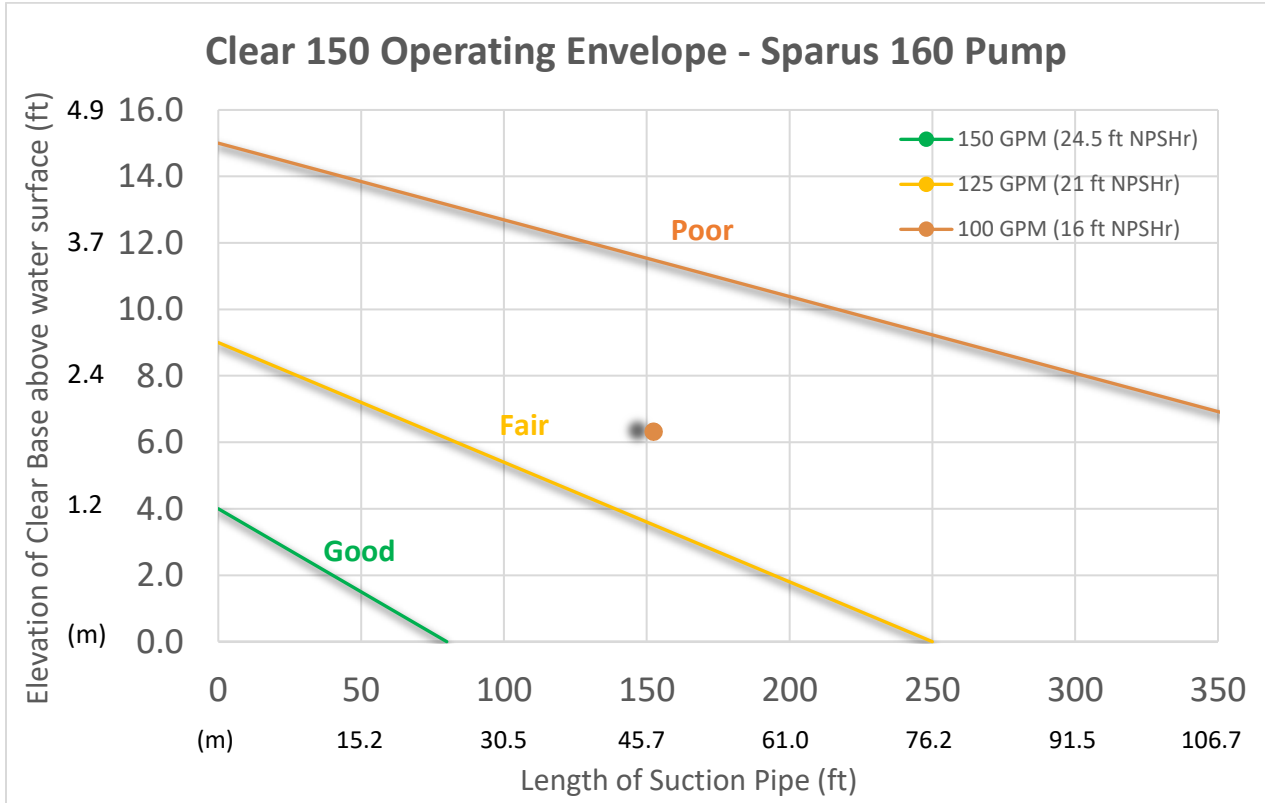
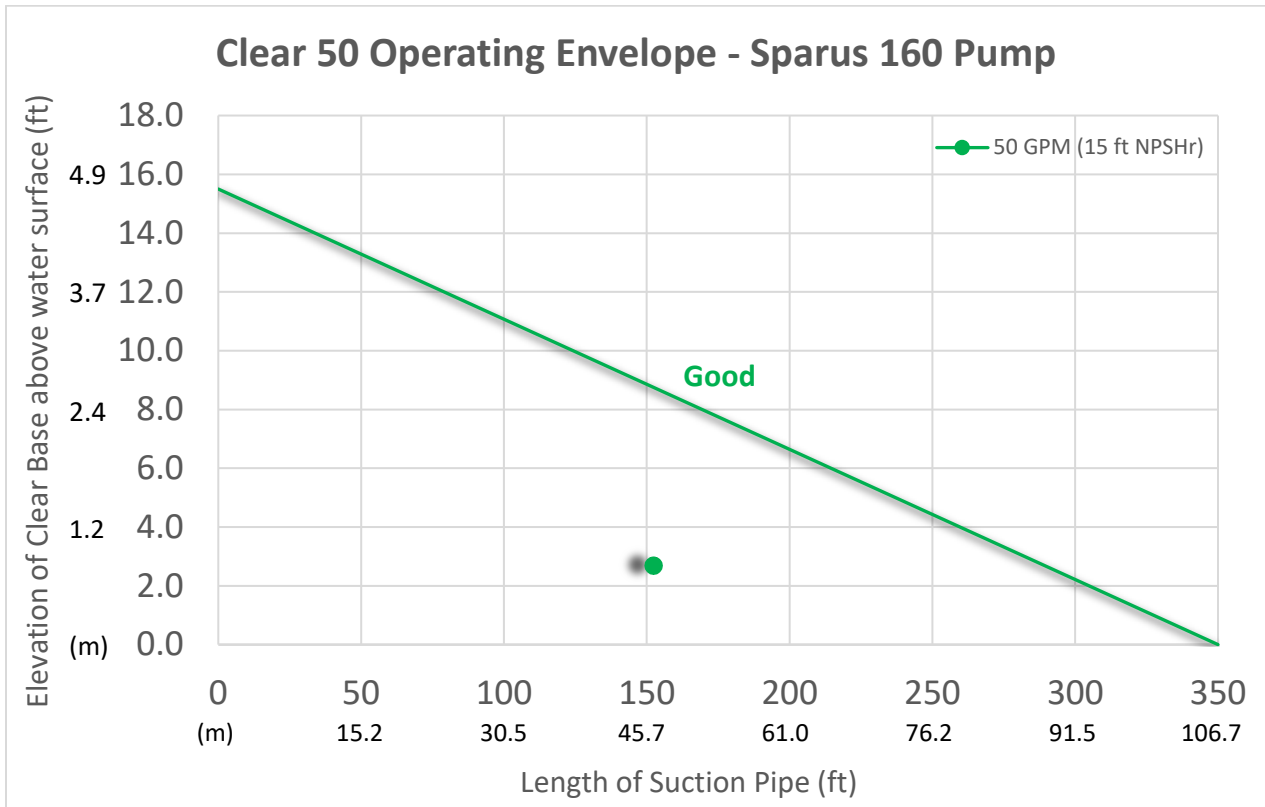


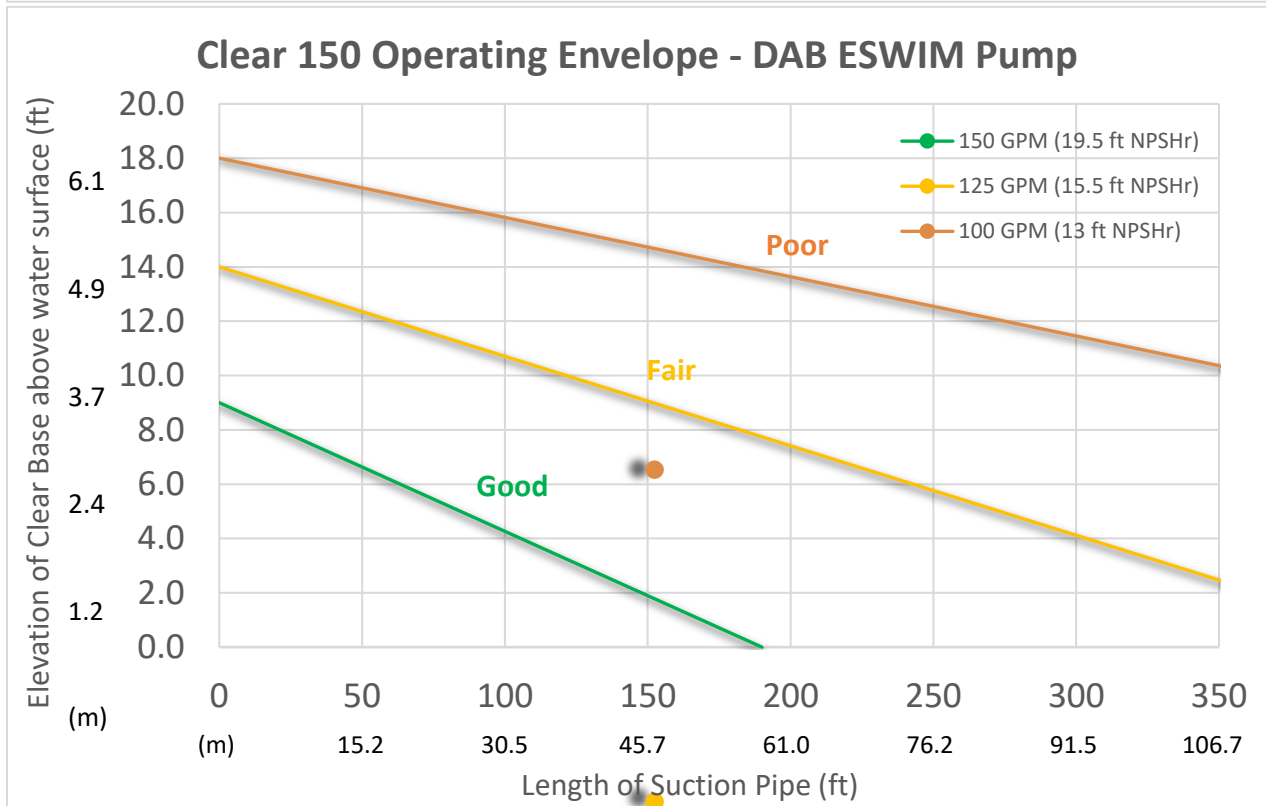
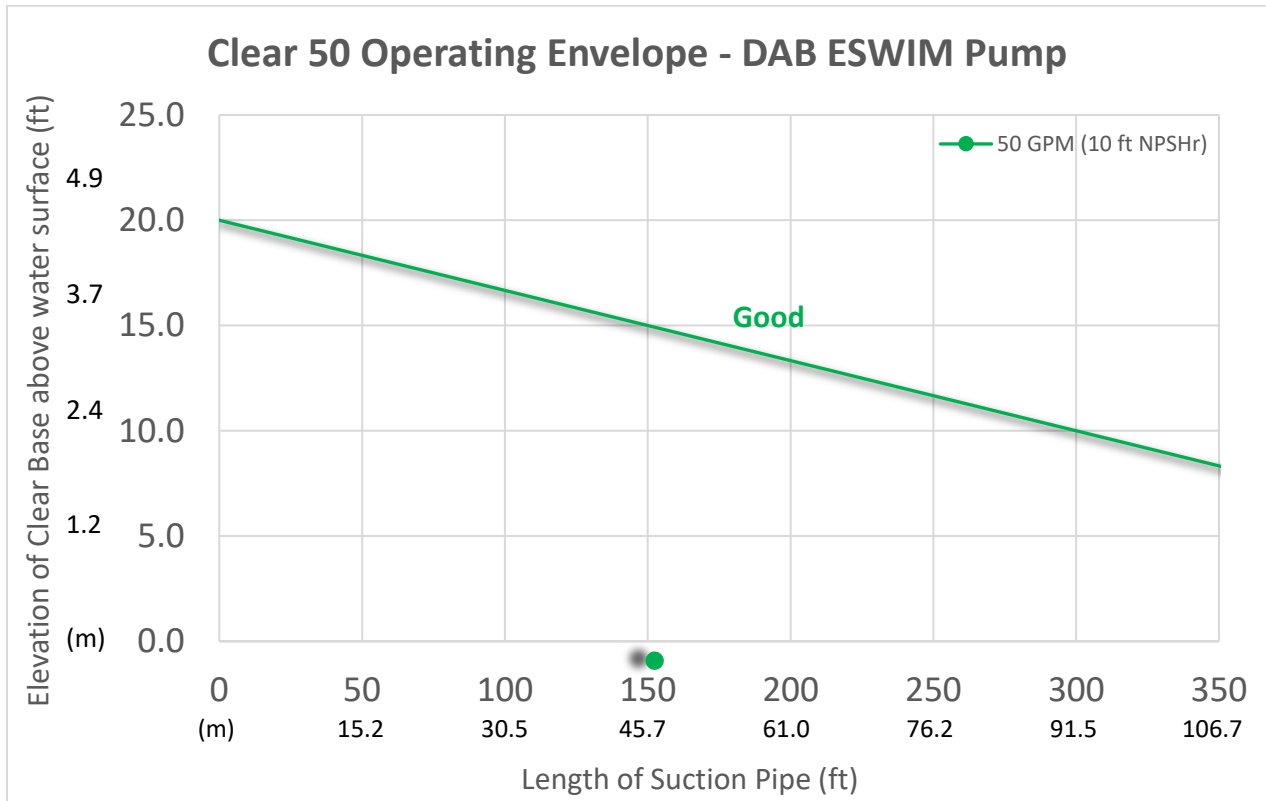
Consider alternate unit siting or sizing.

Reduced operation and loss of efficiency.

Some reduction in operation likely

Preferred install conditions





APPENDIX: INSTRUCTIONS FOR SOLVENT WELDING PVC PIPES