



112663 Aquaponics System I*

A balance between hydroponic vegetable production and fish rearing, GS Series I Aquaponics Systems allow you to produce high-quality produce and fish through the process of combining a hydroponic-growing system with a fish-producing aquaculture tank.



112663	AQUAPONICS SYSTEM I
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*Actual system may differ from what is shown.

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Revision date: 12.23.15

Important Information

READ THIS DOCUMENT BEFORE YOU BEGIN

Thank you for purchasing the 112663 aquaponic system. When properly assembled and maintained, this system will provide years of reliable service. These instructions include helpful hints and important information needed to safely assemble and properly maintain the system. Please read and understand these instructions **before** you begin. If you have any questions during the assembly, contact customer service.

SAFETY PRECAUTIONS

- Wear eye protection.
- Wear gloves when handling metal pipes.
- Use a portable GFCI (Ground Fault Circuit Interrupter) when working with power tools and cords.

REQUIRED TOOLS

The following list identifies the main tools needed to assemble the aquaponic system. Additional tools may be needed.

- Tape measure and marker
- Variable speed drill (cordless with extra batteries works best)
- Small hammer and gloves
- Level (4'– recommended) and line level
- Utility knife or scissors
- Tool to cut pvc tubing
- Assorted hand tools common to construction, plumbing, and electrical work
- Drill bit set with assorted bits
- Large adjustable pliers (3"-4" jaw)



ASSEMBLY PROCEDURE

Following the instructions as presented will help ensure the proper assembly of your aquaponic system. The steps outlining the assembly process are as follows:

1. Verify that all parts are included in the shipment. Notify customer service for questions or concerns. See below.
2. Read and understand these instructions and the information included with the shipment **before** you begin.
3. Gather the tools and assistants.
4. Assemble the system.
5. Read the maintenance and additional information provided near the back of this guide.

UNPACK AND IDENTIFY PARTS

The following steps will ensure that you have all the necessary parts **before** you begin assembly.

1. Unpack the contents of the shipment and place where you can easily inventory the parts. Refer to the Bill of Materials/Spec Sheets.
2. Verify that all parts listed on the Bill of Materials/Spec Sheets are present. If anything is missing or you have questions, consult the Pictorial Parts Guide and all diagrams for clarification, or contact Customer Service.

NOTE: At this time, you do not need to open the plastic bags containing smaller parts such as fasteners or washers (if equipped).



WARNING: Enlist the services of an experienced electrician when connecting power to the pump and other electrical devices.

All wiring to be completed according to established codes and practices.



DROWNING HAZARD: Never allow children or others within the boundary of the tanks, float bed, and pump station at any time.

Always have an assistant present during tank cleaning and system maintenance to prevent accidents.

ABOUT THIS MANUAL

This manual describes how to set up your aquaponic system and check for proper operation. Additional information is presented regarding the basic maintenance of the system. This manual does not however describe how to grow various types of fish and plants. Since the specifics of such an undertaking would fill many books—and they have—it is best to determine beforehand exactly how you want to use this system. Water quality, location, growing environment, available resources, personal knowledge and experience among other things all must be considered before populating your system with fish. Consult with your sales representative for additional resources and information to ensure a successful start.

Important Information

PICTORIAL GUIDE

The following graphics and photos will help identify the different parts of the aquaponic system. (Some parts may not be shown.) **Keep all fittings in the shipping bags until they are needed.**



FA4472B



102921B



100442



FALB34B



111906



112817



112366



111153
2" Check Valve



112285



WF1380 & WF1384



WF1982



WF3511



WF2198 (1-1/2)
WF2199



WF1574 (1-1/2")



WF6684



WF6671



112710 (1")
112367 (1-1/2")
UniSeals



112365



WF1576 (2")



111045



109260



WR1095 Tape



WF6990
PVC Cement



WF1570 (1")



MH1123 (1-1/2")
WF2995 (1")



112965 (1-1/2")
WF8585 (2")



FAPA12



109259 Pump



111148 Pump

Getting Started

ASSEMBLY PROCEDURES

Below are the main steps to assemble your aquaponic system. Procedures can occur simultaneously when assistants are available, or each procedure can be completed before moving onto the next. In most instances, the site and available space drive which procedures can be completed first before moving onto the next. Review this entire guide before beginning to ensure that you understand how to position and connect the different components.

1. Review this guide and all site layout diagrams and prepare the site.
2. Determine the positions of the tanks, float bed, and related plumbing. Allow space all around the system components for maintenance and harvest activities. View the layout diagram for a typical layout.

ATTENTION: If you determine that the typical layout is not right for your aquaponic needs, be aware that changes in this layout may require the purchase of additional pvc tubing. Tubing can be purchased locally, or contact your sales representative for additional details.

3. Construct the float bed as shown in the diagrams. ***Float bed requires a flat, level surface free of debris and obstructions.*** Install and assemble the frame according to instructions. Install the float bed liner.
4. Position the tanks and assemble and install the system plumbing.

NOTE: Tanks when filled are heavy. Position tanks on a solid, level surface. If a concrete floor is not present, use concrete blocks or similar pavers to create a solid, level surface *for each of the holding tanks.*

5. Install the main water pump and connect pump to the tank plumbing. Consult the services of a certified and competent electrician when connecting the pump to power. Customer is responsible for supplying a solid, stable mounting surface for the water pump.
6. Install the air pump, connect air stones, and place stones in tanks and float bed. *Install air pump above the water level in the holding tanks to prevent siphoning in the event that the air pump shuts down.* Customer is responsible for supplying a solid, stable mounting surface for the air pump.
7. Fill system with water and check for leaks.
8. Prepare the biofiltration tank.
9. Read and follow the care and maintenance information.

BASIC CARE AND MAINTENANCE

Daily

1. Check all fittings, tubes, and pipes for leaks.
2. Check all pumps to ensure they are working properly.
3. Check water level in each tank. Verify that no water is flowing through the overflow pipes. Adjust flow as needed and monitor the results.
4. Inspect all electrical connections and wires to the pumps for damage or corrosion.
5. Clean solids from the primary filter over the biofiltration tank.
6. Check all water parameters.
7. Keep the area around the float bed and tanks clean and picked up. Do not allow miscellaneous tools or maintenance and harvest equipment to stack up against the tanks or float bed.

Weekly

1. Clean all the air stones and check for a strong, even airflow through each stone. Replace defective or damaged stones immediately.
2. Flush the in-tank standpipes. See procedure near the back of this guide.
3. Clean the secondary filter that sits atop the netting inside the biofiltration tank. Remove, hose off, and set back into the tank.

Monthly

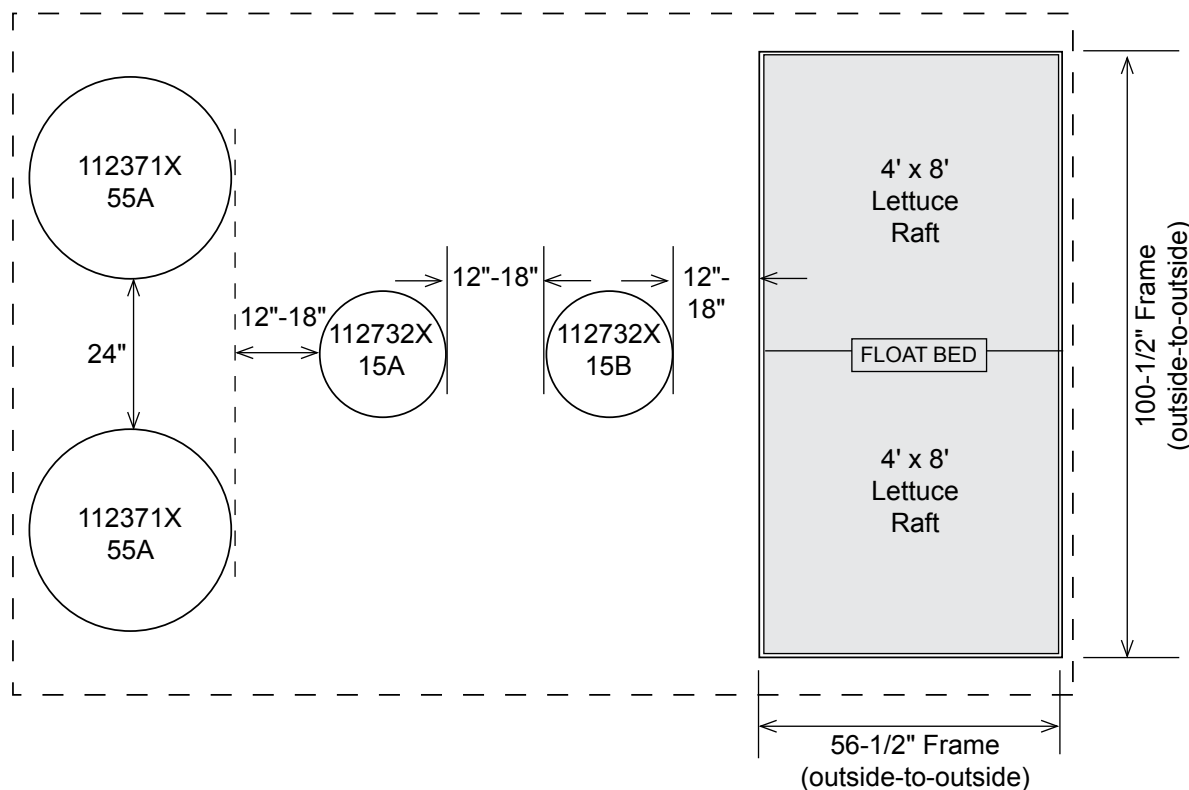
1. Test water hardness.
2. Inspect all pump mounting bolts and mounts. Tighten and repair as needed.

Aquaponic System Site Plan—Sample

1

The diagram below shows the basic layout of the 112663 aquaponic system. Use this diagram when planning where to position your system. Review all diagrams and photos in this guide before you begin.

ATTENTION: Diagram below shows the recommended system layout. Increasing the distance between tanks or between the tanks and float bed may require the purchase of additional pvc tubing and/or fittings.

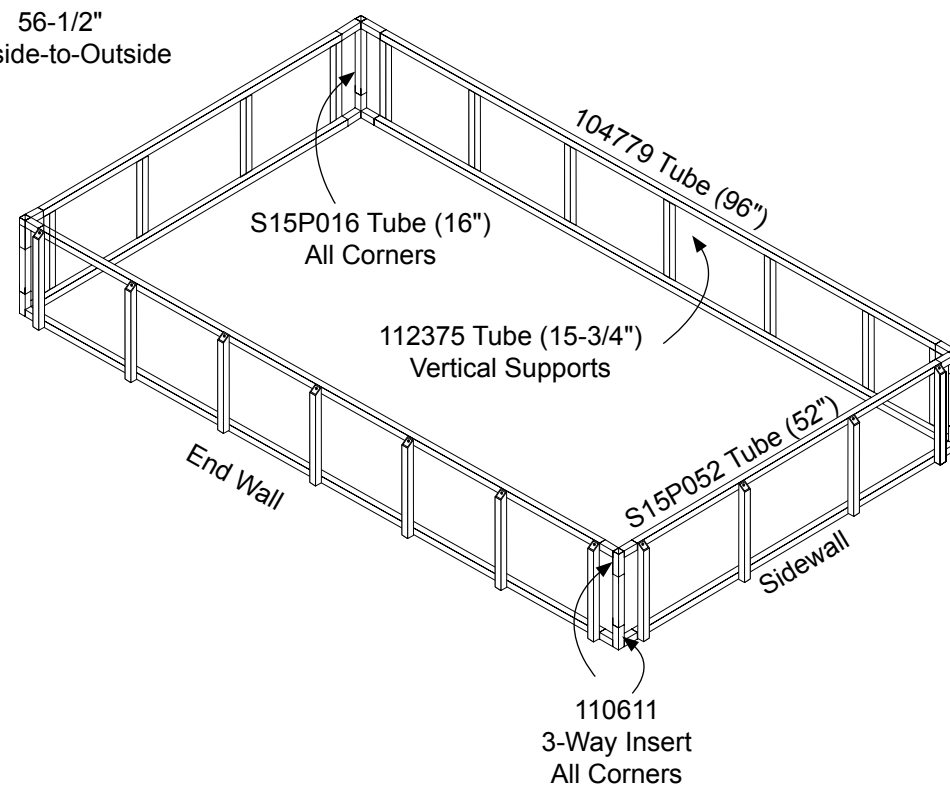
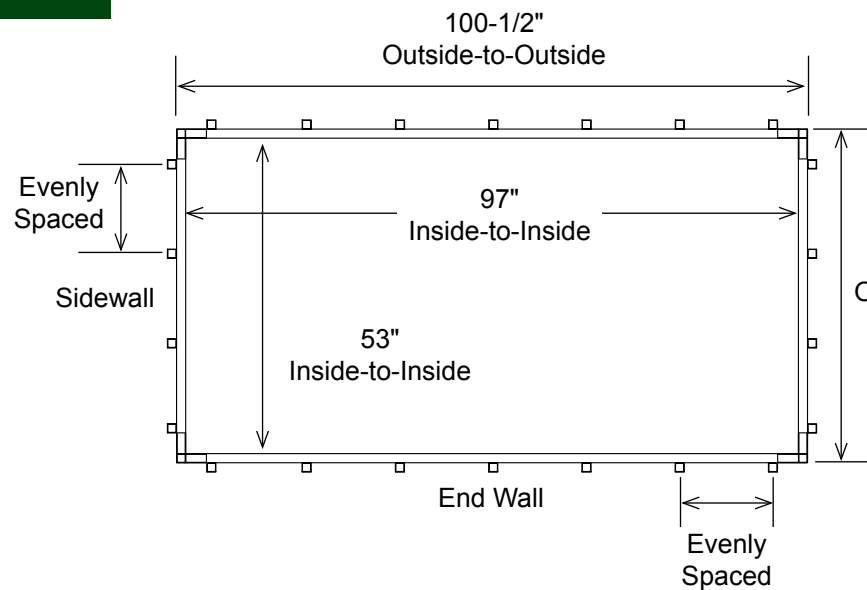


BASIC REQUIREMENTS:

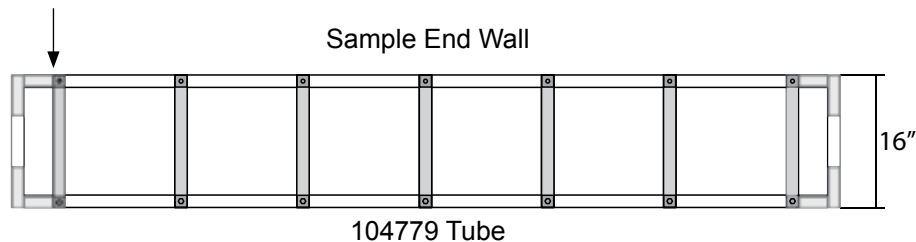
1. Assemble float bed on a flat, level surface free of debris and objects that could damage the liner. Surface must be capable of supporting the weight of the float bed when filled with water.
2. Position all tanks on a solid, level surface. Surface must support the weight of all tanks when filled with water. (For reference only: A gallon of fresh water weighs approximately 8.3 pounds.)

Frame Dimension Diagrams

2



Install vertical tube
tight against the
3-way corner insert.



Assemble the Float Bed Frame

2

Use the photos below and the diagrams on the previous page to assemble the frame.

ATTENTION: Do not install any FA4472B Tek screw along the top edge of the float bed frame. This surface is reserved for the installation of the float bed liner.

Required parts:

- 110611 3-Way Corner Insert (8)
- S15P016 Square Tube @ 16" (4)
- 104779 Square Tube @ 96" (4)
- S15P052 Square Tube @ 52" (4)
- 112375 Square Tube @ 15-3/4" w/45° Cuts (22)
- FA4472B Tek Screws
- 100442 Magnetic Nut Setter



1. Install all 16" (S15P016) tubes flush with the open end of each 110611 3-way corner connector.



2. Install all FA4472B Tek screws into the sides of the fittings. **Do not install along the top frame rail.**



NOTE: Do not install any Tek screws in a location that will touch the liner once it is installed.



3. Install the first and last vertical support for each end or side wall tight against the 3-way corner connectors.



4. Install all vertical supports for side and end frame flush with the horizontal tubes.



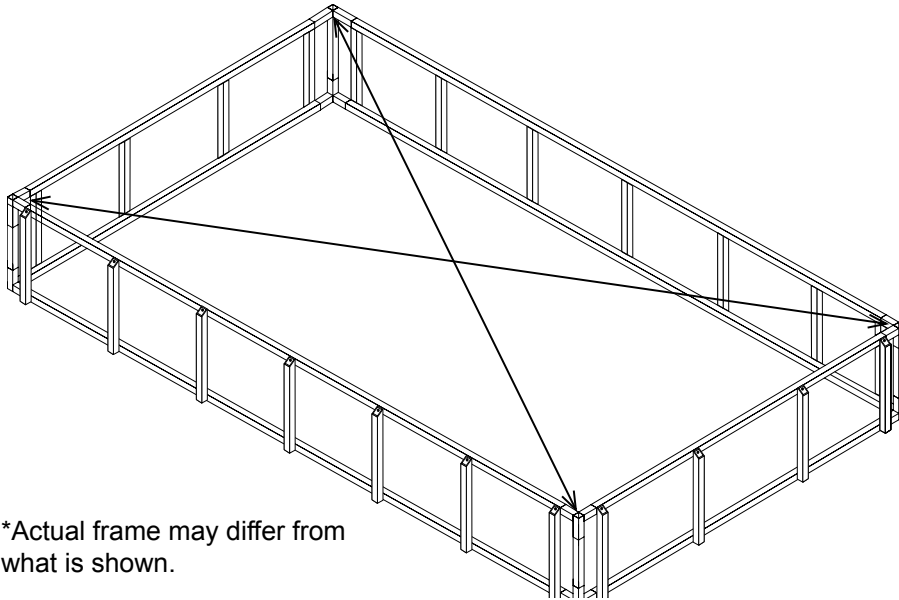
5. Use the diagrams on the previous pages to evenly space the vertical supports along the sides.

Assemble the Float Bed Frame—continued

2

Square the Assembled Float Bed Frame*

After assembly, check all connections to verify that Tek screws are properly installed. Next, measure corner-to-corner diagonally as shown. When dimensions are the same, frame is square. Finally, level the frame. Prepare the site inside frame if not on a solid surface such as wood or concrete.



*Actual frame may differ from what is shown.



Insulate Float Bed Frame

3

Insulate the Float Bed Frame

Once the frame is level, use the rigid board insulation to insulate the sides of the frame and the surface that supports the bed liner. The frame shown in the example below may differ from the actual frame. Steps to insulate are similar. Use the photos as guides to insulate your float bed frame.



1. Measure and cut the insulation to the required size.



2. Working from inside the frame, install the insulation panels.



3. Continue this pattern until the ends and all sides of the frame are insulated.



4. Next, insulate the floor of the float bed frame by placing the rigid board insulation into position.



5. Begin at one end and work toward the other. Level the surface if needed to create an even base for the liner. Cut panels to the needed dimensions.



6. Before installing the liner material, inspect the bed surface and remove any debris that could damage the liner.

Install Tek Foil Liner

4

Install Tek Foil Inside Frame

After installing the rigid board insulation, add the Tek foil. Use the supplied duct tape to hold the foil in place during installation. Overlap the seams as needed to ensure proper coverage. Neatly fold foil at the corners to allow for an easier installation of the bed liner.



Install Float Bed Heat Tubing

5

Install Heat Tubing for the Float Bed

If needed, consult the services of a qualified contractor familiar with the installation of similar heating systems.

ATTENTION: Regardless of float bed size, follow these general guidelines:

- Maximum length of any tube loop should not exceed 300';
- There should be at least two (2) loops per float bed;
- Loops must be of equal length.

In order to maintain a constant water temperature, in many climates it is necessary to heat water. Your float bed includes tubing; however, additional purchase is required for the remainder of components needed. **Contact your sales representative for additional details.** Use photos that follow to install tubing.



1. Tape both ends of tubes to prevent dirt and debris from entering during installation.



2. Determine where you want tubes to enter and exit float bed and create holes in rigid board and foil.



NOTE: Allow a few feet of tube to extend beyond frame to connect to heating unit. (Additional purchase required for heating unit and parts.)



3. Determine a pattern and install tubing in evenly spaced rows throughout float bed. Install outside runs close to frame edge. **Allow approximately 10" between the individual runs of tubing.**



ATTENTION: Photos show using special clips to hold tubing. These are not supplied. Use the supplied duct tape and tape tubing to the foil. Once liner is installed and filled with water, tubing will not move. **Do not use metal wire or staples to secure tube.**



4. After installing tube loops, inspect area and remove any dirt and debris that could damage liner material.
5. Continue with the installation of the float bed liner.

Install Float Bed Liner

6

Once the liner bed is prepared, continue with the installation of the liner. Assistants are required.

Required Parts:

- 110097S1 Liner (12' x 9')
- FA4472B Tek Screws, 102921B Washers, and 100442 Nut Setter

ATTENTION: During the installation of the liner, do not drop any tools or sharp objects into the liner bed. Doing so can puncture the liner! Exercise caution!



1. With assistance, carefully spread the liner over the assembled frame. Ensure that equal lengths overhang each end and side.



2. Beginning at one corner, carefully work the liner into the corner and along the inside of the base rails.



3. Fold the liner evenly into the corner and up and over the top of the frame rails. Try to remove as many wrinkles as possible.



4. Take two (2) FA4472B Tek screws and two (2) 102921B neo-bonded washers and carefully secure the liner to the top of the frame.



NOTE: These fasteners will be removed after the entire liner is in position and the aluminum retaining strap is prepared for installation.



5. Move to another corner and press that liner into place.

Install Float Bed Liner—continued

6

LINER INSTALLATION—CONTINUED

ATTENTION: During the installation of the liner, do not drop any tools or sharp objects into the liner bed. Doing so can puncture the liner! Exercise caution!



6. Cut the material as needed to allow it to fit more evenly at the corners.

ATTENTION: Do not drop any sharp objects into the bed liner at any time. Contact your sales representative for products used to repair damage to the liner if needed.



7. Repeat the steps to secure the liner material.
8. Check the bottom of the liner for wrinkles and remove these by working the material toward the free edge of the liner.



9. Start adding water to the float bed to allow the water to seat the liner inside the frame.

NOTE: Once the liner is fully secured, there should be no tension on the fasteners. Adding water now helps to achieve that result.



10. Move to the remaining corners and repeat the steps to temporarily secure them to the frame.



11. While the bed continues to fill, remove any excess material that touches the ground. Allow 8"-10" to remain for the final steps. It will be used to pull the liner into final position.

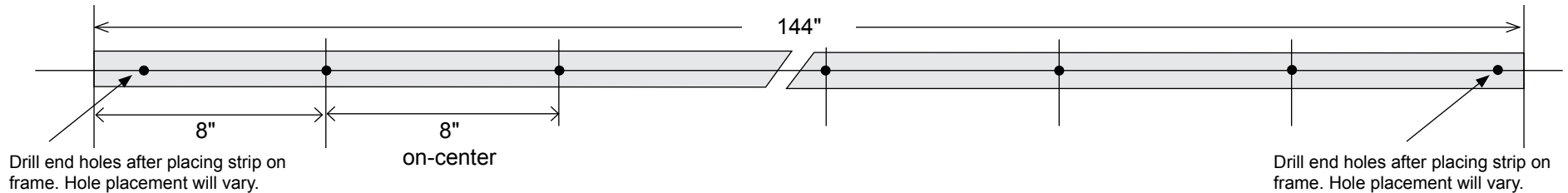


12. Continue filling until bed is half full.
13. Complete the steps to prepare and install the aluminum retaining strap.

Prepare and Install Aluminum Retaining Strap

7

Take the 112480 aluminum flat stock and mark the mounting hole locations according to the diagram below. Use a 1/4" drill bit to drill the fastener holes in the center of the stock at 8" on-center. Do not drill these around or on the float bed frame or liner. Doing so can cause filings to drop into the water. These will damage the water pump once it is installed and running. Drill in a drill press if possible to keep holes uniform. Cut drilled stock to length as needed during installation. Attach aluminum retaining strap to frame using the FA4472B Tek screws.



1. Begin at a corner and remove the Tek screw and washer to install first prepared strap.



2. Align strap with end of frame and attach using the FA4472B Tek screw.



3. Grip edge of bed liner with duck-bill locking pliers or similar tool.



4. Apply slight downward force to stretch liner material and secure strap with Tek screws.



5. Continue attaching straps to the frame until the entire perimeter of the bed liner is secure.



6. Using a utility knife or scissors, remove excess bed liner material. Allow 2"-3" to remain below the edge of the retaining strap.

Prepare the Secondary Filter for the Biofiltration Tank

8

Prepare Secondary Filter

When installed, the secondary filter helps remove solids from the water in your aquaponic system. Place this filter in the biofiltration tank on top of the netting inside the tank. Complete these steps to cut the filter from the bulk **112747** material sent with your system.

1. Take the filter material and spread it out on a flat, even surface.
2. Next, place a **55 gallon tank** on top of the material to use as a pattern. This tank is larger than the 15 gallon tank used in the biofiltration position; using it for the filter pattern will produce a larger filter to better fit inside the smaller tank.

NOTE: If filter is too large, trim to the desired size.

3. With the tank in place, use a scissors to cut around the tank to create the circular secondary filter.

ATTENTION: The remainder of the material can be used for additional secondary filters, or it can be used to cover your fish tanks when small fish are present.

4. Fold or roll up the remainder of the material for future use.
5. Set the tank and filter aside until needed and continue with the next procedure.



Tank Plumbing and Installation

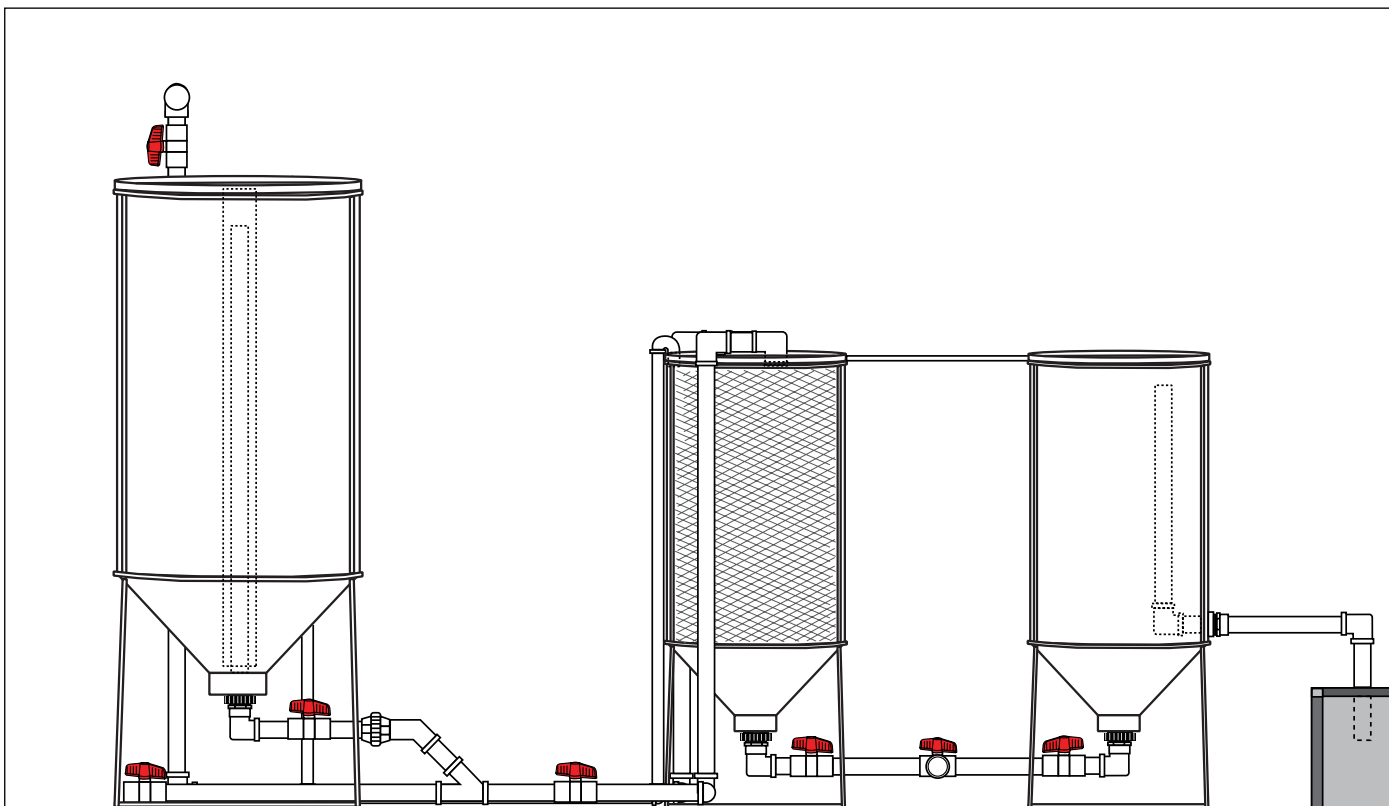
9

The assembly of the fish-holding tanks and filter tanks can occur simultaneously depending on the number of assistants. To better understand the overall plumbing of the system, review all of the diagrams and photos on the following pages before you begin. After review, gather the different components, set the tank frames and tanks, and plumb the system.

To correctly assemble the plumbing:

- Wrap the threads of all outside-the-tank fittings a few times using the WR1095 thread tape before assembly.
- Use the WF6990 pvc cement to connect all remaining fittings to the pvc tubing.
- Dry fit all connections before you glue them to ensure everything fits properly.

IMPORTANT: Consult the services of a professional plumber if you are unfamiliar with the basic plumbing practices of cutting and gluing pvc pipe and fittings.



Install Tank Fittings and Seals

9a

Before you begin setting up your system, take each tank and install the 1-1/2" bulkhead fitting in the bottom. Next, using the diagrams on the following page, install the seals in the remaining holes.



112965 (1-1/2")
Bulkhead Fitting

Install a 112965 (1-1/2") bulkhead fitting in bottom of each tank:



1. Take one bulkhead fitting and remove the locking nut.



2. Verify that the rubber gasket remains on the threaded male body of the fitting.



3. With assistance and the tank on its side, slide the fitting into the bottom hole from inside the tank. Rubber gasket is inside the tank.



4. With someone holding the fitting in place inside the tank, twist the nut onto the threads of the fitting. Threads are reversed. Turn counter-clockwise.



5. After the nut contacts the tank surface, lightly grip it with a large pair of adjustable pliers and tighten. Nut should be snug tight. Do not overtighten.



6. Inspect the assembly to ensure the nut is fully seated against the tank. Repeat these steps to install all remaining bulkhead fitting.

Install Tank Fittings and Seals—continued

9a

After installing all 1-1/2" bulkhead fittings in the bottom of each tank, continue by installing the 1" and 1-1/2" Uniseals®. Press these seals into the pre-drilled holes from outside the tank.

ATTENTION: Depending on location, most tanks require one or more Uniseals®—1" or 1-1/2".



112710 (1")
112367 (1-1/2")
UniSeals

Install a 112710 (1") Uniseal® in each 1-3/4" hole in the top 2" rim of a tank. Install the 112367 (1-1/2") Uniseals® in each 2-1/2" hole in the side of a tank near the top. Seal installation depends on tank location in the system. Some tanks do not require seals.



1. Take the Uniseals® and separate by size. There are two sizes for this system: 1" (112710) and 1-1/2" (112367).



2. Take the 1" Uniseals® for the overflow pipes and install in the upper 2" rim of the tanks as shown.



NOTE: Only some tanks include these pre-drilled holes. Do not use sharp tools to install. Doing so can damage the seal and tank surface.



3. Carefully push the 1" seal into the hole in the rim of the tank. Install all remaining 1" seals in the rim. Some tanks do not need these seals



4. Take all remaining 1-1/2" Uniseals® and install these in the 2-1/2" pre-drilled holes in the upper sides of the tanks.



NOTE: Some tanks may only include a 2-1/2" pre-drilled hole in the sides. Other tanks, depending on position, may include multiple holes for the seals.

Install Pipes Inside the Tanks

9b

Follow these steps to prepare and install the plumbing inside the fish-holding tanks and mineralization tank:

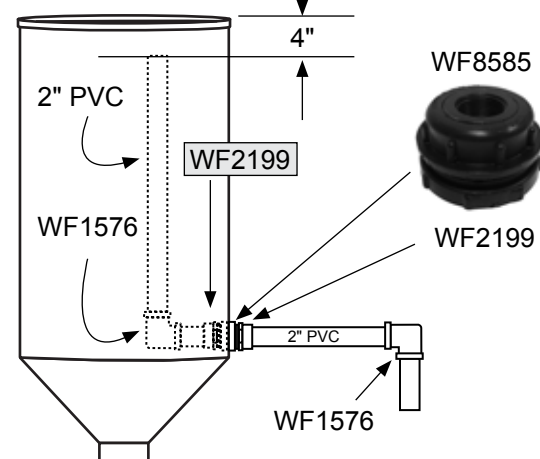
1. Cut a section of 1-1/2" pvc tubing (WF4140) that reaches from the bottom of the tank to the bottom of the connecting pipe.
2. Glue a WF2198 adapter to one end of the tube. Allow the glue to set. See diagram and photo to the right.
3. Take the assembly and install it in one of the large fish-holding tanks. Hand-tighten only. Do not tape the fitting threads.
4. Verify that the top of the pipe reaches to the bottom of the connecting pipe. See dashed line in the diagram below.
5. Repeat these steps for all remaining standpipes for the fish-holding tanks only.
6. Set large, fish-holding tanks in frames, add a gallon or so of water, and check the bulkhead fittings for leaks.
7. Move to the mineralization tank and install those fittings and related inside 2" pipe. Use the diagrams below and to the right.



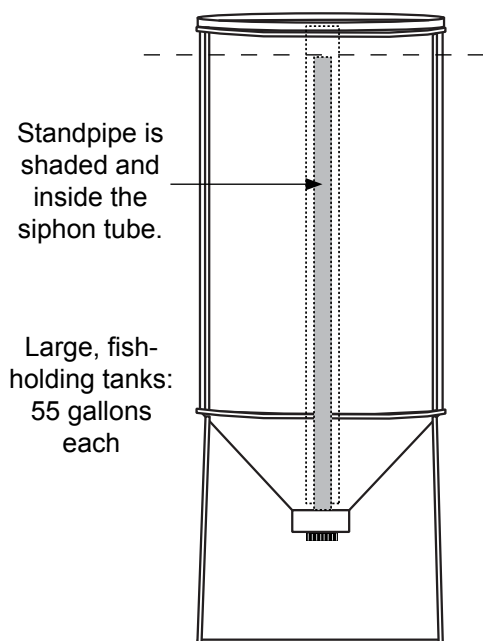
See shaded pipe in large tanks for standpipe locations.



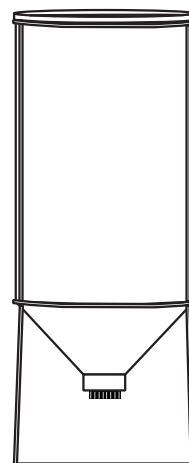
Mineralization Tank:
Plumbing



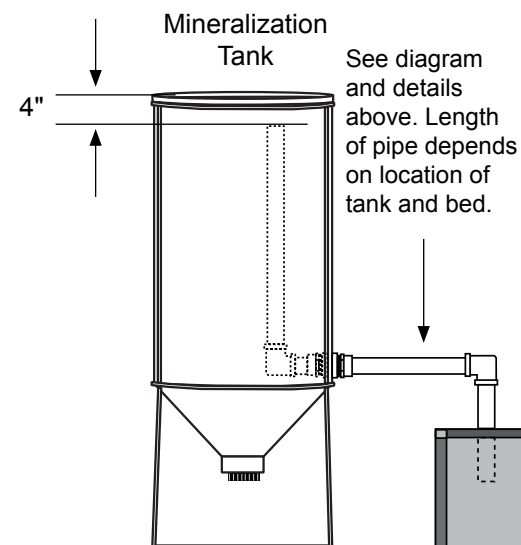
Install mineralization tank plumbing: **Set tank in frame.** Disassemble bulkhead fitting. Attach additional fittings to main bulkhead body, which will be installed inside tank. Secure bulkhead assembly to tank. **End of 2" vertical pipe is 4" below top of tank.**



Length of installed standpipe should reach to the underside of the connecting pipe.



SET TANK IN FRAME BEFORE YOU INSTALL BULKHEAD FITTING!

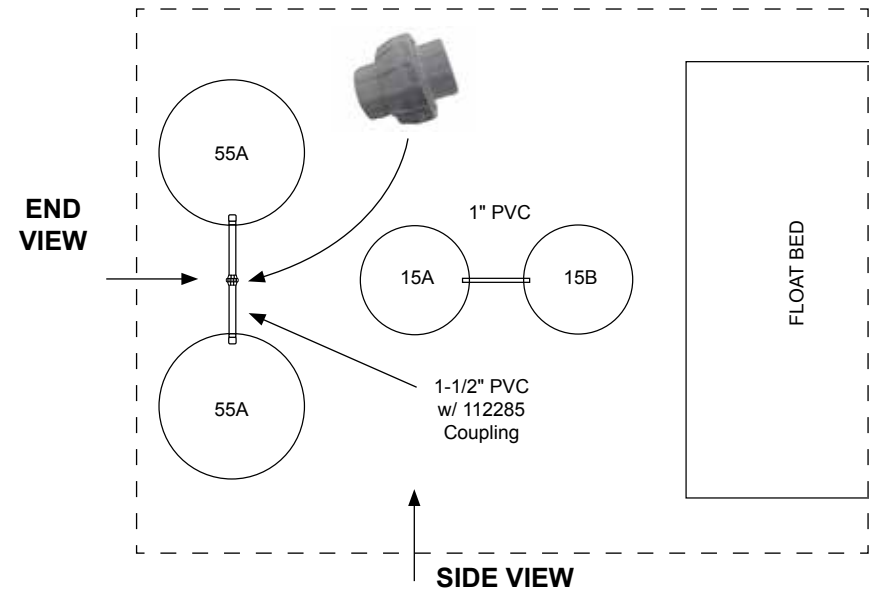


Upper Connecting Pipes—Between the Tanks

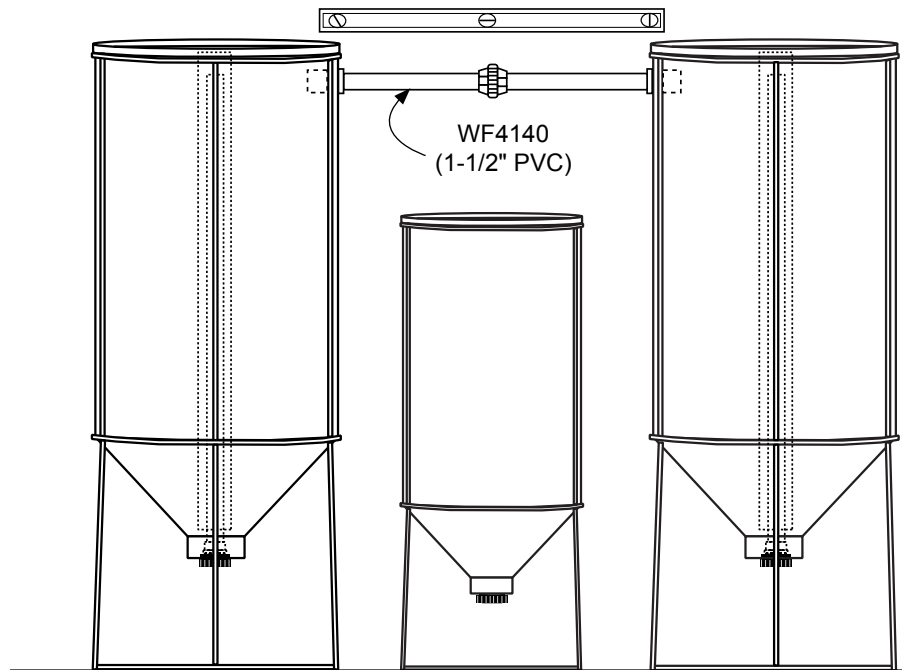
9c

Install the plumbing between the tanks.

1. Set the tank frames in position using the layout diagram as a guide. See page 5. When filled, tanks are heavy! Position all tank frames on a level, solid surface. **Level all tanks before filling with water.** Once plumbed, these tanks cannot be moved. Exceeding the space-between-tanks dimensions may require additional pvc tubing and fittings.
2. Set the tanks in the tank frames and align the tank holes to install the between-the-tank pipes. Examine the tanks and install according to the positions shown in the diagrams.
3. Align the holes of the different tanks. After setting tanks in the frames, verify they are level. Tubing between the larger fish-holding tanks is 1-1/2"; overflow tubing between the smaller filter and mineralization tanks is 1". Verify fittings and tubing size on the diagrams before you cut and glue connections.

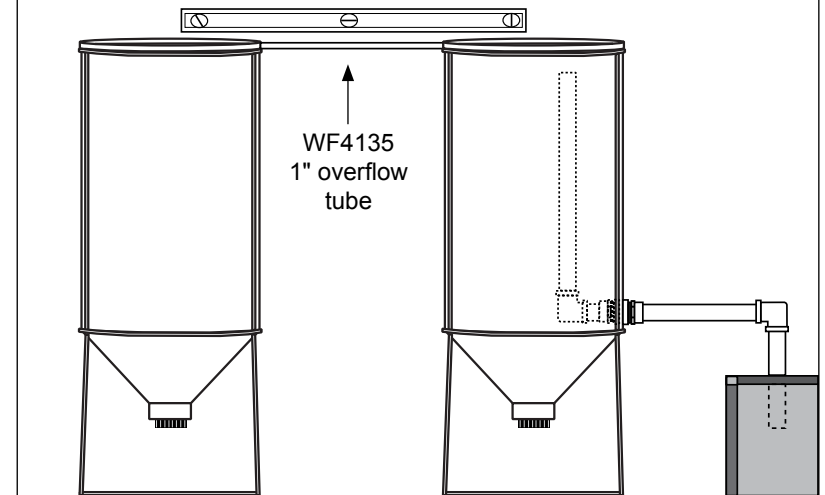


END VIEW



IMPORTANT: All pvc assemblies *between the tanks* must be level! After installing these, position a level between the tanks and adjust frames as needed. See the diagram.

SIDE VIEW



Assemble Lower Manifolds

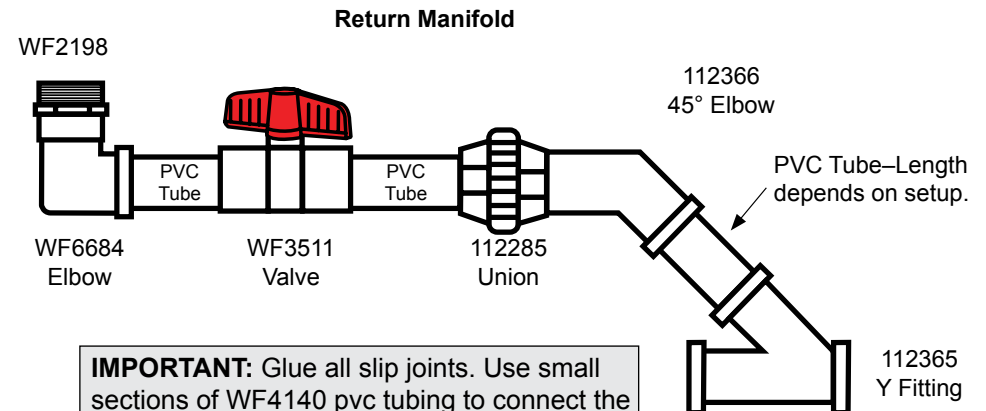
9d

The return manifolds and related plumbing direct the water to the biofiltration and mineralization tanks. All return manifolds for the large, fish-holding tanks are the same. There are also drain manifold assemblies for the smaller filter and mineralization tanks. Follow these steps to correctly assemble and install these manifolds and related plumbing components:

1. Using the diagram below, assemble and install the return manifolds for the large, fish-holding tanks. Review all diagrams.

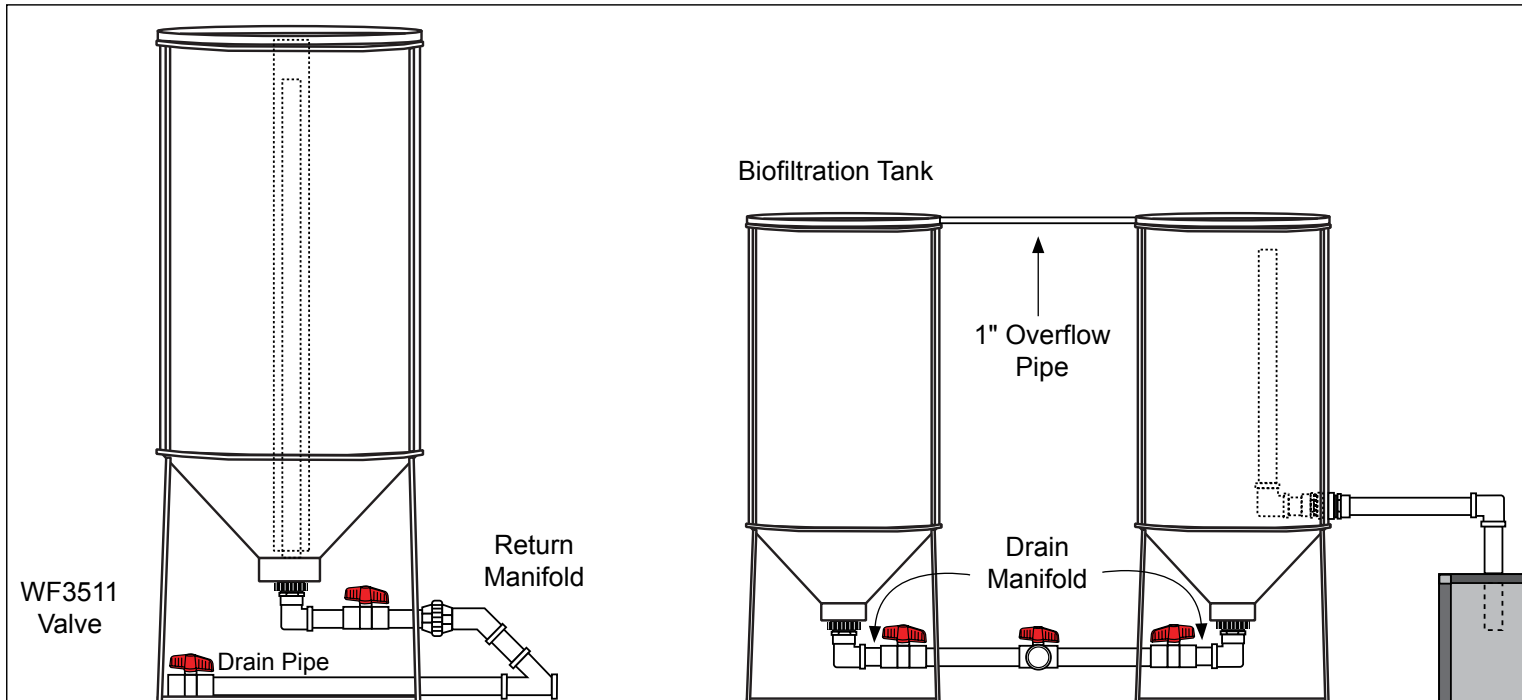
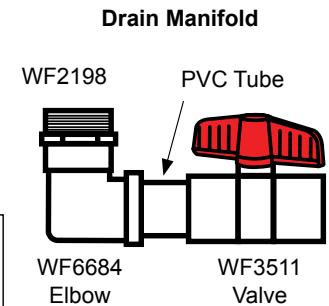
ATTENTION: Dry fit all connections before gluing to ensure a proper fit.

2. Assemble and install the drain manifolds of the smaller biofiltration and mineralization tanks.
3. Assemble and install the drain pipes. See photos on the next page.



IMPORTANT: Glue all slip joints. Use small sections of WF4140 pvc tubing to connect the different fittings. Adjust lengths as needed to achieve the best fit for your system.

IMPORTANT: To protect the valve and related fittings, do not allow the drain manifold to extend beyond the tank frame.



Assemble Lower Manifolds—continued

9d

Photo to the right shows the lower manifold connections for the large fish-holding tanks for the aquaponic system.

Minor adjustments may be required depending on tank positions.

Length of pvc pipe may differ from what is shown. Tank positions, overall layout, and location of float bed will affect pipe length.

Changing layout may require the purchase of additional materials.



Photo to the right shows the biofiltration tank and the mineralization tank as connected by the drain manifolds.

Length of pvc pipe depends on tank and float bed positions.

Glue all joints and allow to dry before checking for leaks.

Individual preferences may result in a different appearance.



Install 1" Overflow Pipe to Biofiltration Tank

9e

Install the 1" overflow pipe above the horizontal 1-1/2" pvc pipe that connects the two fish-holding tanks adjacent to the filter tanks. This pipe runs to the ground, over to the base of the biofiltration tank, and up to the top of tank. Construct the overflow pipe assembly using the 1" pvc tubing (WF4135) and 1" elbows. Glue all joints. Slide pipe into the 1" seal in each tank. Wet pipe for easier installation.



WF1380



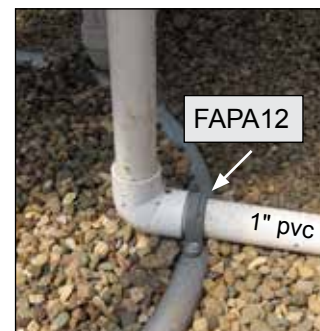
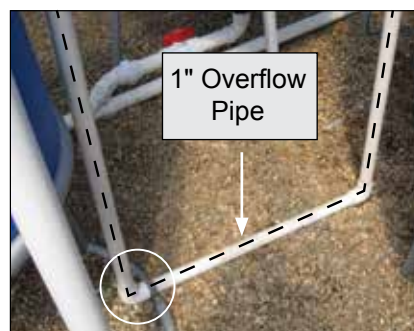
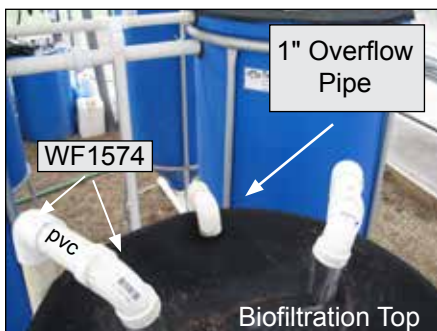
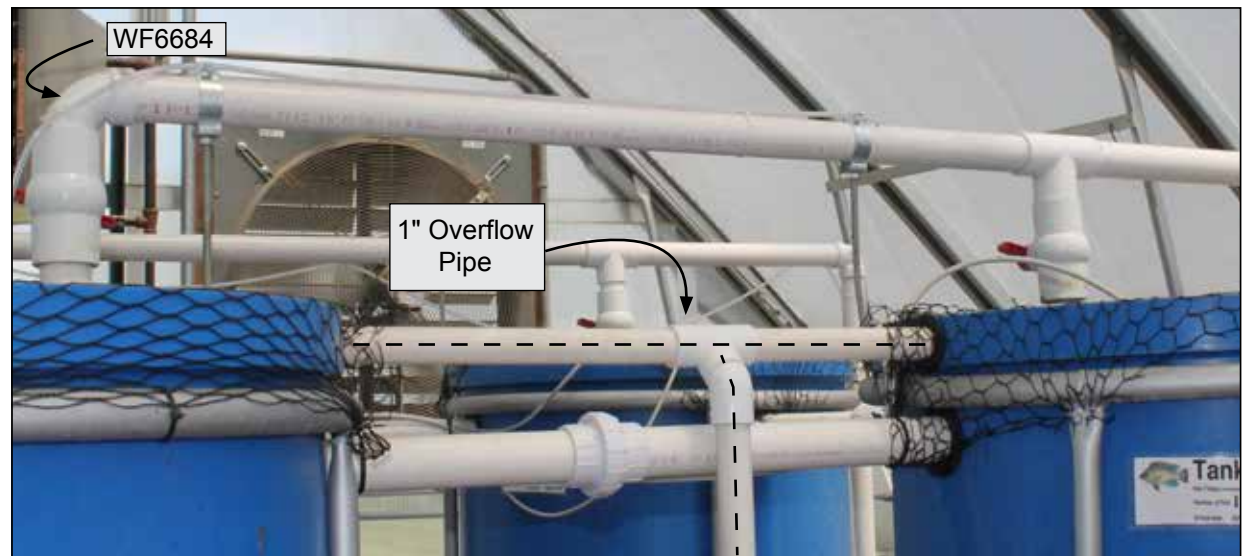
WF1570



111045



FAPA12



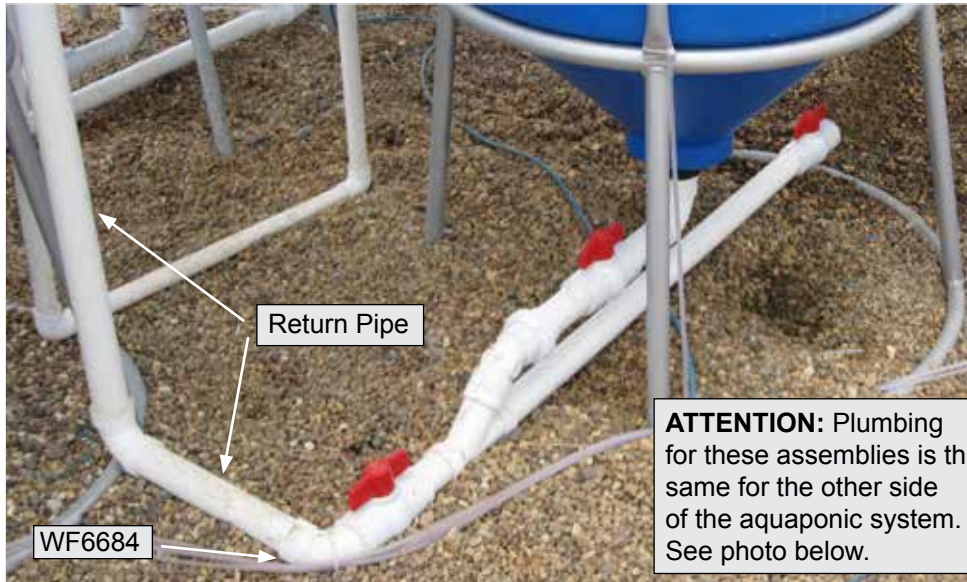
ATTENTION: Tank frame design may differ slightly from what is shown.

NOTE: Use the FAPA12 u-clamp and two Tek screws to secure the 1" overflow tube to the base of the biofiltration tank frame. Use the remaining clamp to secure other end to the floor to prevent movement.

Install 1-1/2" Return Pipe to Filter Tank

9f

Using the WF4140 pvc tubing, install the 1-1/2" return pipe assemblies. Use the photos* to route these from the return manifolds of each bank of fish-holding tanks to the biofiltration tank.



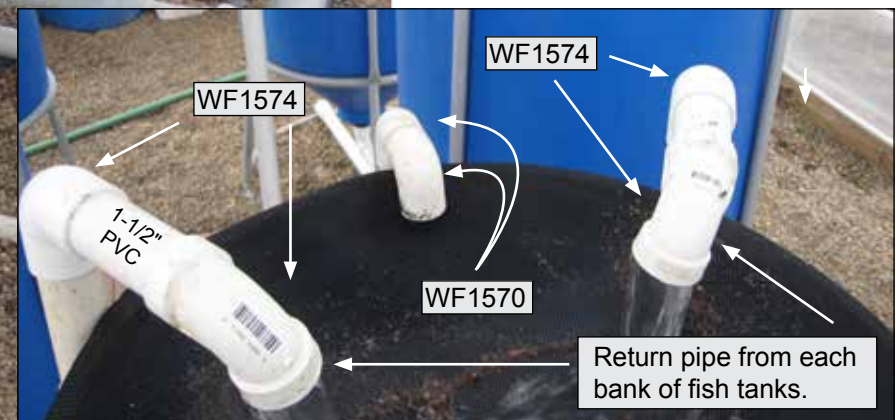
WF3511



WF1574 (1-1/2")



*Actual system may differ from what is shown as an example.



Connect 1-1/2" Supply Lines from Pump to Tanks

9g

The 1-1/2" pvc supply line runs from the outlet side of the water pump to each fish-holding tank.



Complete these steps:

1. Review the diagrams and photos to determine the position of the main supply line from the water pump to the fish-holding tanks.
2. Assemble the over-the-tank supply pipes and valves and install the mounting brackets. Review diagrams and photos for position. See next page for bracket parts and positions.

ATTENTION: Do not center over tank. Run lines off-center to allow access to tanks for fish harvest and tank maintenance.

3. Assemble main supply line and connect to the over-the-tank pipes.
4. Connect main supply line to outlet manifold of water pump as described in Procedure 10: Connect Main Water Pump.

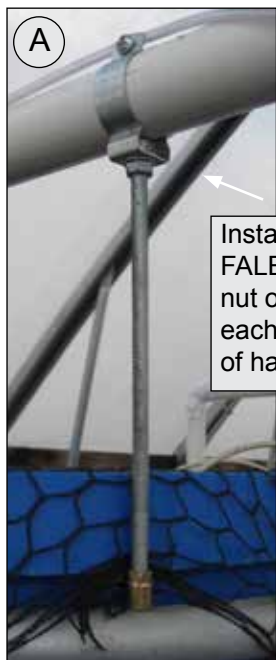


Connect 1-1/2" Supply Lines from Pump to Tanks—continued

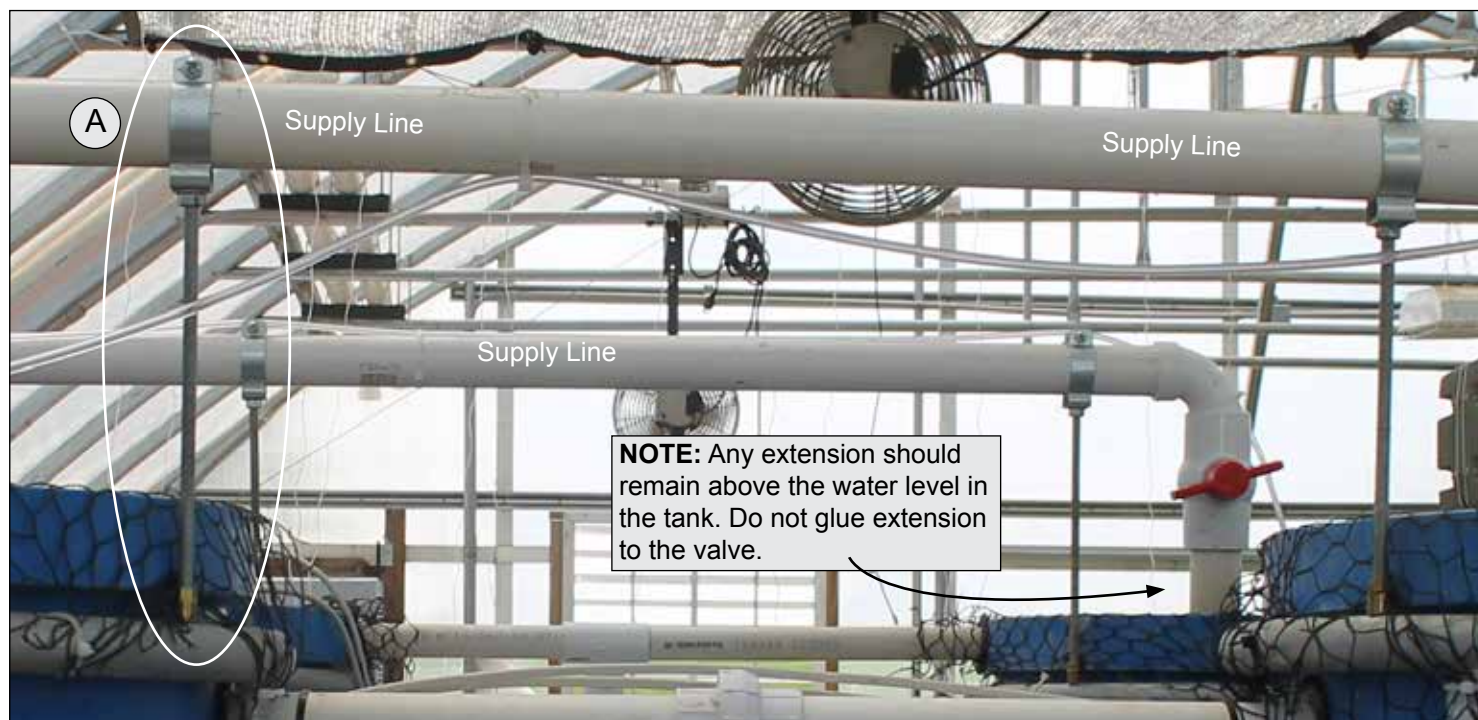
9g

To secure each supply line over the fish-holding tanks, construct the mounting brackets as shown below. Cut threaded rods to same length to keep pipes level over tanks. Use a socket and drill to drive the 111906 mounting nut into the tank frame. Required parts:

- FAK36 Threaded Rod
- FALB34B 3/8" Nuts
- 112817 Conduit Hanger
- 111906 Sammy for 3/8" Rod



Install FALB34B nut on each side of hanger.



Connect Main Water Pump

10

CONNECTION MAIN WATER PUMP

After assembling the main water supply lines and securing the overhead pipes to the tank frames, install the pump and attach the main supply pipes. Follow these basic steps and requirements:

1. Read and understand all documentation sent with the water pump before installation.
2. Mount the water pump on a solid, stable stand near the end of the float bed opposite the tank location. Review all photos and diagrams for additional details and an example. *Customer to supply all materials and fasteners for pump mount and to secure pump to mount.*
3. Use the diagram below to attach the 2" pvc pipe, elbow, and check valve to the intake side of the pump.



WARNING: Enlist the services of an experienced electrician when connecting power to the pump.

All wiring to be completed according to established codes and practices. Disconnect the pump when performing any system maintenance.



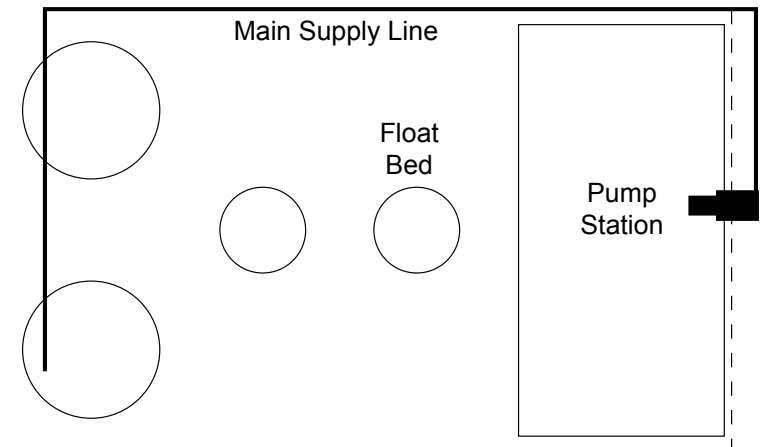
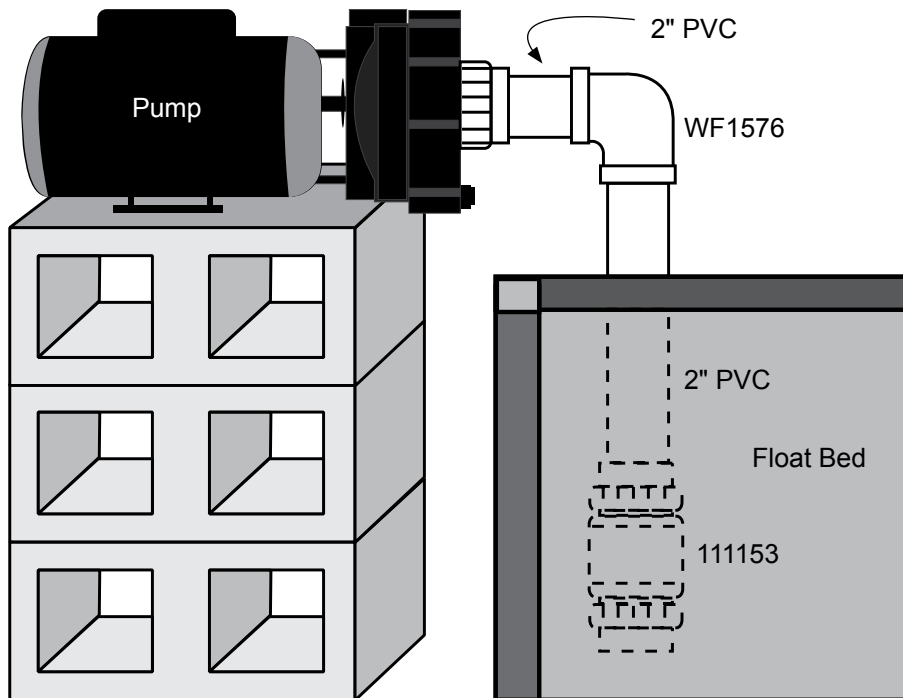
111153
2" Check Valve



WF1576 (2")



WF6990
PVC Cement



Top view showing main supply line.

Connect Main Water Pump

10

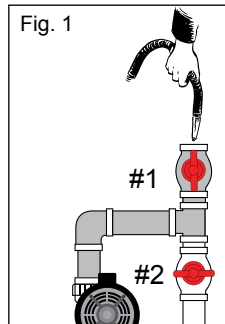
CONNECTION MAIN WATER PUMP—continued

4. Assemble the 1-1/2" pvc supply manifold using the parts shown and connect it to the outlet side of the main pump and to the main supply lines to the fish-holding tanks. (See diagram on the previous page.)
5. Consult the services of a qualified electrician to provide power to the water pump. **To prevent damage to pump, do not run the pump without water in the pipes.** See the "Prime the Pump" steps below.
6. Fill float bed and tanks with water if this has not been done.
7. Prime the pump as described below or continue with Procedure 11 on the next page.

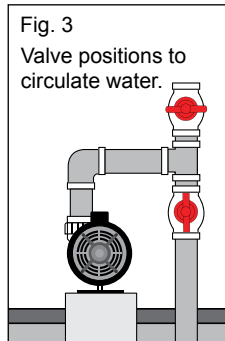
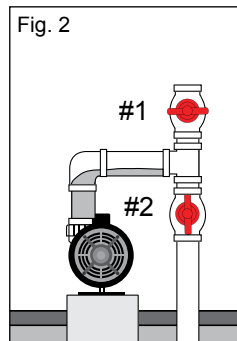
ATTENTION: Pump can be primed now or later.

Prime the Pump

1. After connecting the pump as shown (lower right), open Valve #1 and close Valve #2. Add water to fill the pipe and pump manifold (Fig. 1).



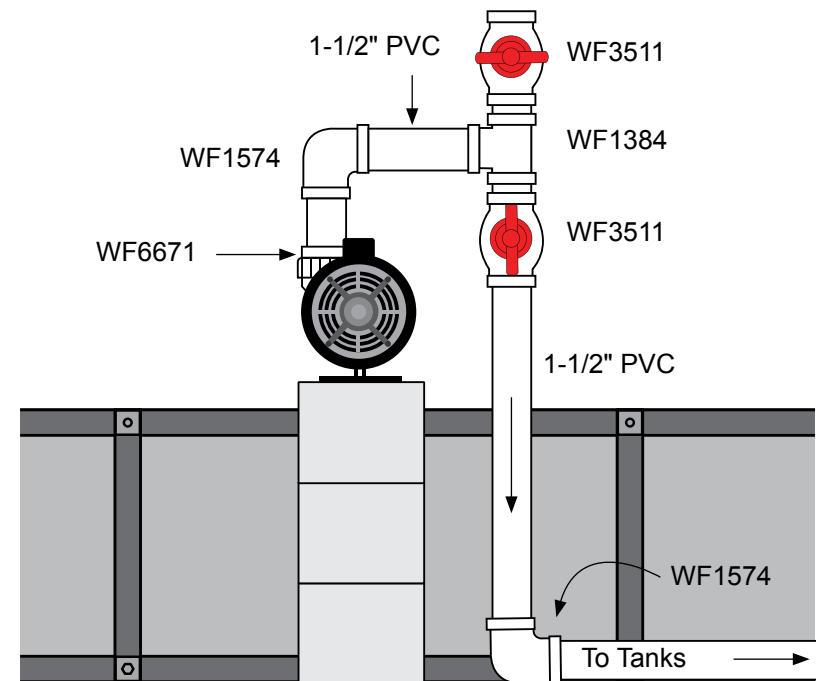
2. Close Valve #1 and open Valve #2 (Fig. 3).



3. Verify that valves above the tanks are open and turn on the pump to begin circulating water throughout the system (Fig. 3).

ATTENTION: If the pump starts, but does not pump water within a few seconds, turn it off immediately and repeat this pump priming procedure.

If your second attempt fails, turn off the pump and open both valves. Fill supply line until water level reaches Valve #1. Close Valve #1 and turn on the pump to begin pumping water. **Never open Valve #1 or close Valve #2 when pump is running! At least one above tank supply line valve must be open when pump is running.**



Install Air Pumps, Tubes, and Air Stones

11

The air pumps supply oxygen to tanks and the float bed to improve water quality and oxygen levels. Complete the following steps to install the air pumps and related tubing. Customer is responsible for supplying a mounting surface for the pump and fasteners to secure pump to surface.

Requirements:

- Mount the pump(s) **above the water level** in the fish-holding tanks.
- Secure all tubing to the tank frame and water pipes to prevent accidents and damage.
- Pump(s) must run continuously. Do not connect to a timer.
- Place air stones in only the tanks identified on the top view diagrams.
- Mount pump in a location that does not exceed the amount of WF1050A hose sent with the system. This hose connects pump to the manifold.
- Position the manifold in a location that will allow uniform tube lengths.
- Air tube length when connected to the manifold and stone should allow the stone to reach to the top of the cone section of the tank.



Actual manifold setup may differ. Secure manifold to mount.

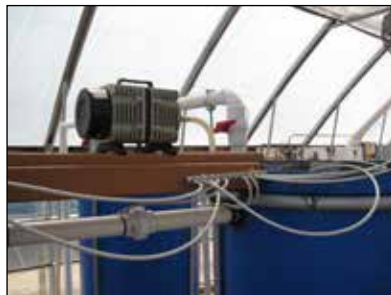


Photo shows air pump mounted above water level. Example only.



Slide 111046A tube onto air stone. Wet hose or nipple on stone for easier installation.



Attach free end of tube to manifold and drop stone into tank or float bed.



White tubing (111046A) length should allow each stone to reach this depth in the tank.

Photo shows air pump mounted on customer-supplied shelf. Pump can also be mounted away from tanks above water level. Position cannot exceed the length of 1/4" clear, braided tubing (WF1050A) sent with the system. Measure tubing to ensure you have enough to reach from the pump position to the distribution manifold position.

Install Air Pumps, Tubes, and Air Stones—continued

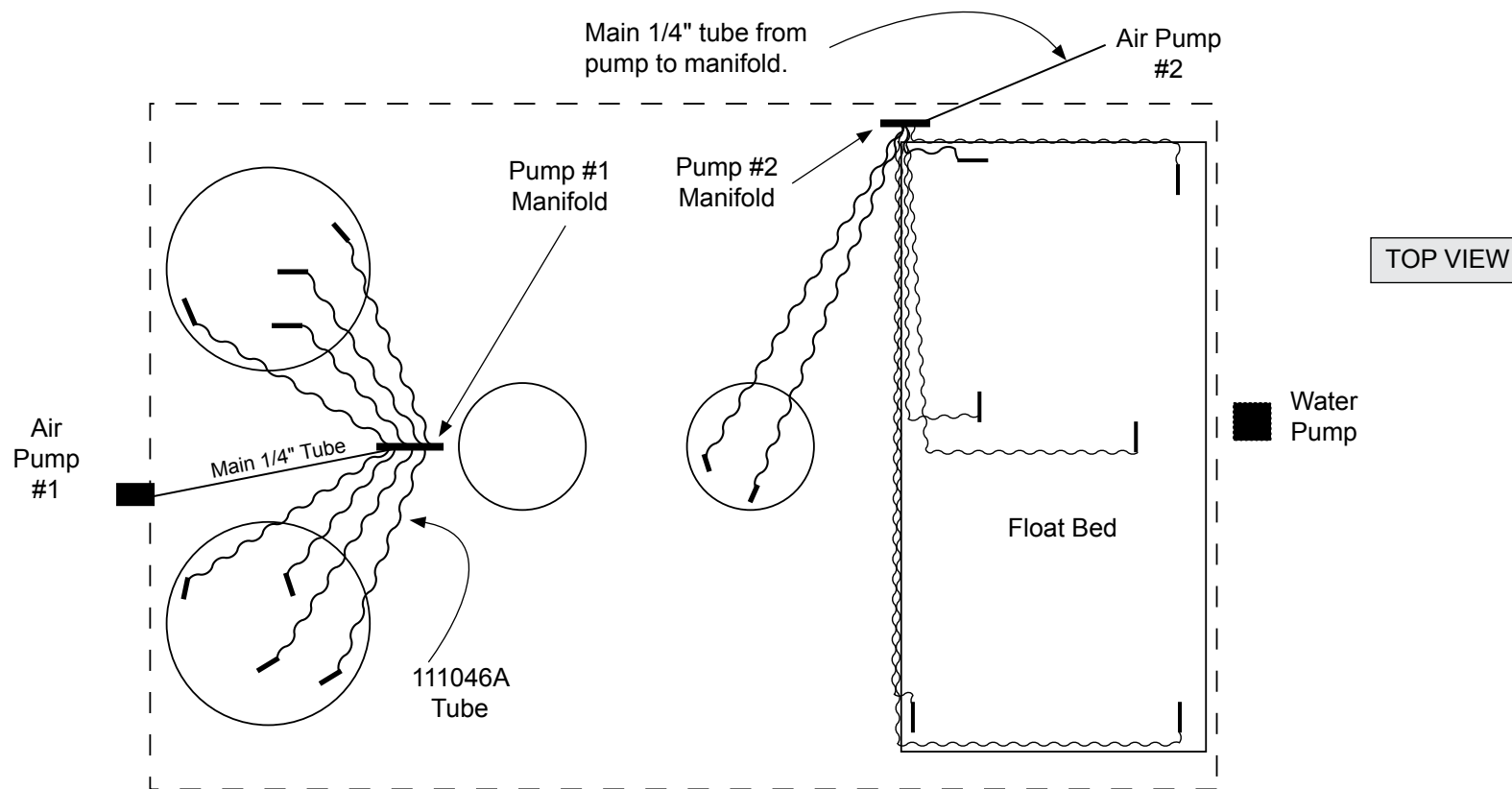
11

Use the information and diagram below to position the pumps and install the correct number of air stones in the float bed and correct tanks.

- Use WF1050A 1/4" hose to connect the air pump to the distribution manifold.
- Use the 111046A 1/8" white UV poly tubing to connect the air stones to the manifold.

PUMP #2: Use six (6) air stones for this float bed. Evenly position stones throughout the bed. **Do not position any stone near the main water pump.** Run the tubing along the float bed frame in a position that is protected from lettuce harvesting activities and bed maintenance. Connect these to PUMP #2.

IMPORTANT: Mount PUMP #2 above the level of the water in the mineralization tank.



PUMP #1: Use four (4) air stones in each 55 gallon fish-holding tank. Run the tubing along the tank frame and plumbing. Secure using the plastic ties. Stones should reach to where the cone section of the tank begins. (See diagram on previous page.) Stones can be allowed to float or move around in tank. Connect all stones for the fish-holding tanks to PUMP #1.

IMPORTANT: Mount PUMP #1 above the level of the water in the holding tanks.

PUMP #2: Use two (2) air stones for the mineralization tank. Run the tubing along the float bed and tank frame. Stones should reach to the top of the cone section. Connect these stones to PUMP #2.

12

FINAL SYSTEM CHECK

After the system is completely assembled, follow the guidelines below to complete a final check.

ATTENTION: This manual describes how to set up your aquaponic system and check for proper operation. Additional information is presented regarding the basic maintenance of the system. This manual does not however describe how to grow various types of fish and plants. Since the specifics of such an undertaking would fill many books, it is best to determine beforehand exactly how you want to use this system. Water quality, location, growing environment, available resources, personal knowledge and experience among other things all must be considered before populating your system with fish and plants. Consult with your sales representative for additional resources and information to ensure a successful start.

Complete these steps:

1. Fill the system with water and test for leaks.

Water quality is extremely important. For well water, consult all documentation that you have that pertains to what you plan to grow, and test the water according to those recommendations. If you are using a chlorinated water supply, determine what is used to chlorinate the system. If chlorine gas is used, allow the chlorinated water to “off-gas” for 48 hours after filling the system to remove all chlorine. If the water source uses chlorimine to chlorinate the water and not chlorine gas, you may need to consider an alternative water source. Chlorimine will not “off-gas” and can kill fish.

2. Turn on the pumps (air and water) and check operation. Consult the documentation included with the water pump to ensure it is primed properly during startup to allow it to pump water. Do not allow it to run dry. Check that air bubbles are present in the tanks that include air stones. Check each stone to ensure each is operating properly.
3. Check and adjust water temperature in the system.

Accurate water temperature can be the difference between life and death for your fish. Consult documentation that describes the environment your fish need. The float bed includes insulation and heat tubes installed under the bed liner. This tubing should be connected to a water heater (additional purchase required) to help control the temperature of the water in your aquaponic system. In some climates, it may be necessary to keep the water cooler than the ambient air. Consult with your aquaponic representative for additional information regarding the heating and cooling of your system's water.

4. Check all tank levels and adjust overhead valves as needed to restrict flow and to prevent flow through the overflow pipes.
5. Prepare and install the filter in the biofiltration tank. Complete Procedure 13: Prepare Biofiltration Tank.
6. Read and complete Procedure 14: Biofilter Startup and the Primary Filter.
7. Prepare the plant rafts. Review and complete Procedure 15: Prepare Plant Rafts.

Prepare Biofiltration Tank

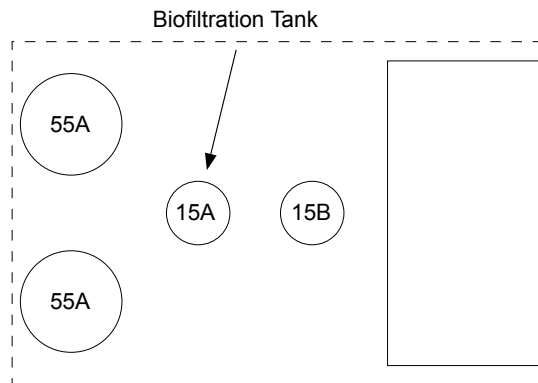
13

Prepare the Biofiltration Tank

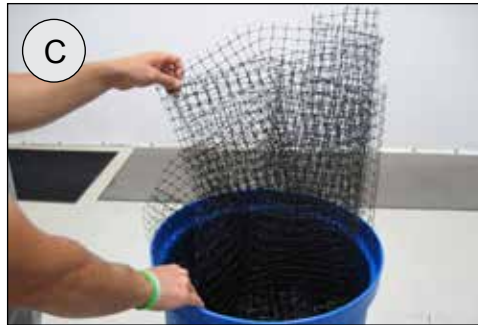
When prepared, this tank includes a primary and secondary filter, inside filter material (109758), and bacteria (customer-supplied) to filter the water. Additional information is presented to help you jump start the biofiltration tank.

Complete the steps that follow to prepare the biofiltration tank.

1. Review the tank layout below to confirm the biofiltration tank position for your system.



2. Cut one (1) twenty foot (20') section from the 109758 roll of netting and set the roll aside.
3. Loosely fold one section and push it into the biofiltration tank.
4. Loosely fold the last section and push that material into the tank until it is below the top collar of the tank. Material may expand above the tank until it conforms to the tank shape. Simply press it back into place.
5. Take the secondary filter from Procedure 8 and place it on top of the netting.
6. Read the information that follows on the next page.



Biofilter Start-Up and the Primary Filter

14

Biofilter Start-Up Information

JUMP START YOUR BIOFILTRATION TANK: One way to “jump start” your biofilter is to obtain some “seasoned” water from a trusted source* such as another aquaponic grower.

A five gallon bucket or so will help start bacterial growth in your biofilter tank. Dump the seasoned water directly into the tank. Once the system is inoculated with good bacteria, add food. These bacteria eat ammonia; you can simply add some over the counter ammonia to the water once your tanks and float bed are filled and the pump is circulating the water. Do this in small increments. One cup per 500 gallons of water is a good balance.

ATTENTION: DO NOT DUMP THE AMMONIA DIRECTLY INTO THE BIOFILTER TANK! Add the ammonia to the float bed, or evenly distribute it in the fish-holding tanks. Do not use ammonia that may have fragrances or other additives. Straight ammonia added to the water is required.

*Be sure that the water source is not carrying unwanted diseases that are detrimental to your system.

BIOFILTRATION

Air and water turnover are crucial to the health of your system. Follow these suggestions once your system is up and running:

1. Watch your fish eat and swim. This is really the best way to see how your system is working. Fish should not swim on their sides or gasp for air at the top of the tank.
2. Learn to recognize what is “normal” and continually watch for anything that just does not look right.
3. Check your water chemistry for temperature, pH, ammonia, nitrite, and nitrate, and especially dissolved oxygen (DO). It will take about 40 days for your water chemistry to “equalize”.
4. Patience is key in aquaponics. Once the biofilter is working properly, check some of the parameters weekly but until then, it is recommended to test all parameters daily.

5. Never modify multiple parameters when troubleshooting the system. Choose one, make an adjustment, allow the system to equalize, and check the results.
6. Look for dead fish. If fish are dead, check water chemistry and follow the previous suggestions to make the necessary adjustments.
7. Keep good records of all changes and results of those changes.

PRIMARY BIOFILTRATION TANK FILTER

The primary filter for the biofiltration tank is cut from the **112746** material provided with your aquaponic system. This material is typically cut to size and stretched over the open top of the tank under the main return tubes.

This filter collects solids that can circulate throughout the system; it is cleaned daily. The photo below shows a primary filter installed on the biofiltration tank. Remove the surface solids using a customer-supplied plastic scraper or similar tool that will not damage the filter material.



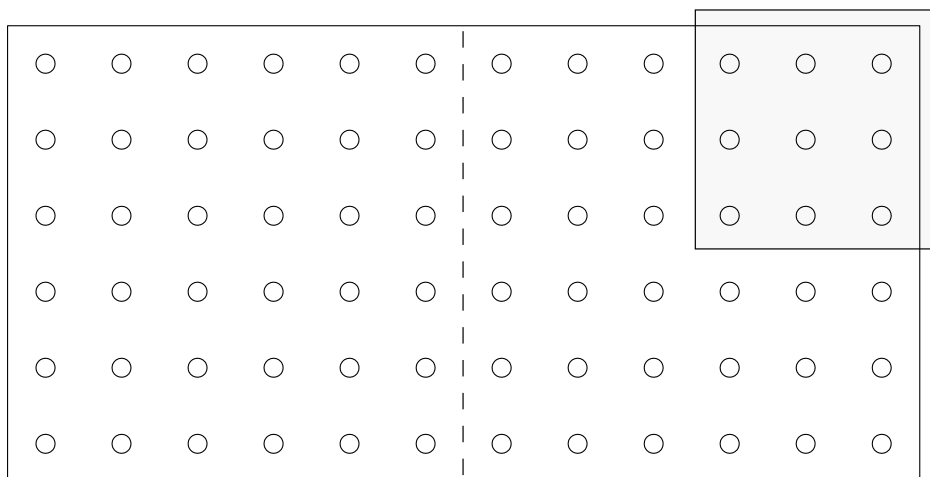
Cut the filter material larger than the top of the tank to allow it to drape over the sides. Secure material in place using customer-supplied fasteners or rubber straps. Fastening system should allow for removing the filter for rinsing and cleaning.

Prepare Plant Rafts

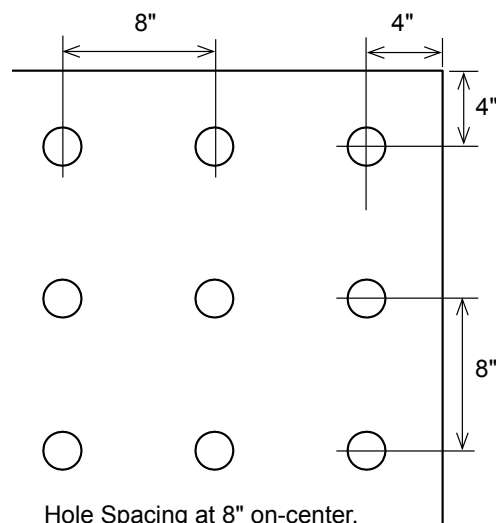
15

Prepare Plant Rafts

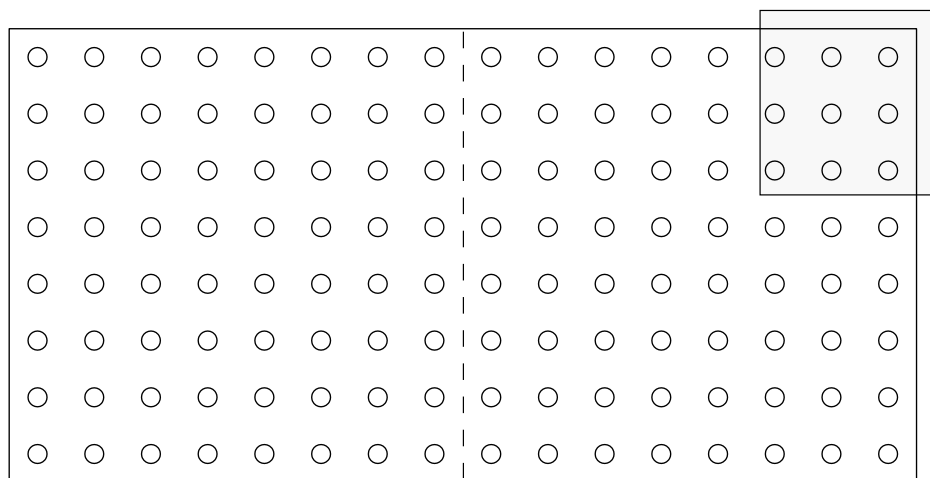
The templates below show two of many different ways to prepare the plant rafts. (There are other patterns.) Each has its advantages. Determine the best pattern for your growing needs and prepare the 4' x 8' rigid foam boards as needed. Rafts can be cut in half (see dashed line) for easier handling and harvesting. Layout the desired pattern and drill the holes. Hole size depends on what plants you intend to grow and the medium that you will use. Consult with your sales representative for additional information about growing plants in your aquaponic system.



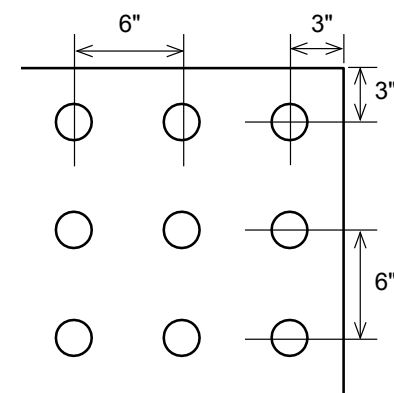
72 Locations: Hole Spacing at 8" on-center (non-staggered)



Hole Spacing at 8" on-center.



128 Locations: Hole Spacing at 6" on-center (non-staggered)



Hole Spacing at 6" on-center.



A step bit* allows for drilling a uniform size hole through the rigid foam board. It also allows you to drill a tapered hole. Determine which type of hole is needed for your planting needs and prepare the rafts accordingly.

*Step bit is not included. Purchase locally if needed.



Photo above shows drilling holes in the rigid foam board using a step bit. Hole pattern is staggered.

Prepare and Install Slip Cap on Tube Between Fish Tanks

16

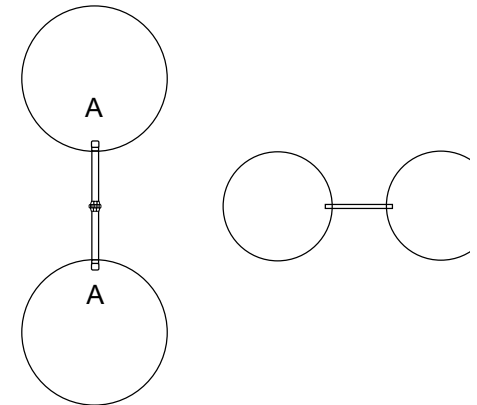
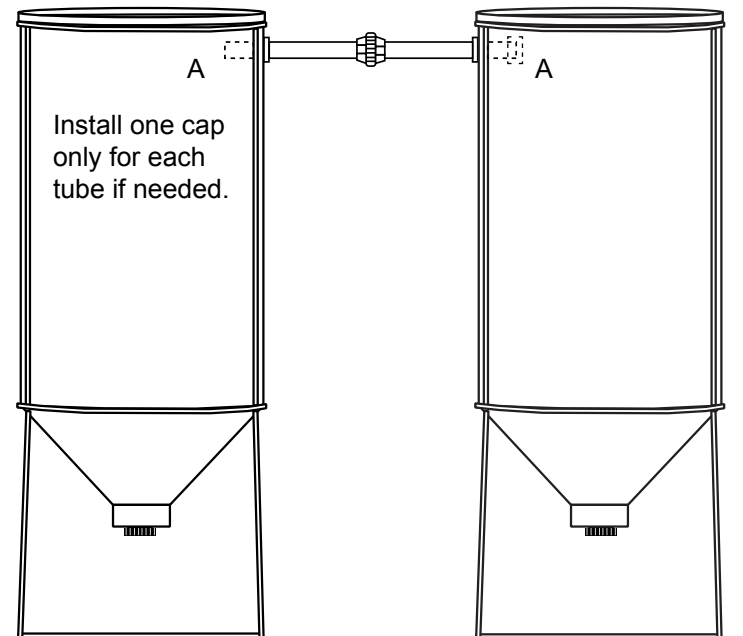
The 1" and 1-1/2" pvc slip caps are used to prevent small fish from passing between the tanks when fish are present. Install one prepared cap at the end of each pipe that connects the fish-holding tanks at the top. Remove caps when fish get too large to fit in a 1-1/2" pvc tube. **Also install a 1" prepared cap on each end of each overflow tube.**

To prepare each cap, complete these steps:

1. Take one MH1123 1-1/2" cap or one WF2995 1" cap and slide it onto a scrap piece of pvc tubing.
2. Gently clamp the tube and cap in a vice to hold it steady.
3. Using a drill and 1/4" bit, **carefully drill holes through the cap**. There is no assigned hole pattern. Drill as many holes as possible without connecting the holes. Holes will allow water to pass between tanks but not small fish.

NOTE: If the fish you are growing are smaller than a 1/4", change the drill bit size, or create a nursery tank to grow the fish until a specific size allows them to be transferred to a larger tank.

4. After preparing the desired number of caps (both 1" and 1-1/2"), remove pvc debris from the cap, and install one 1-1/2" cap on the ends of each pipe connecting the fish-holding tanks that house the small fish and two 1" caps on each 1" overflow pipe. (See pages 21 & 23 for overflow pipe locations.)
5. Check caps frequently to ensure they do not get plugged with debris or fish food. Water must be allowed to pass between tanks to maintain a consistent water level in all tanks.



Install the Siphon Tubes

17

Install Siphon Tubes

Siphon tubes slide over the standpipe in each fish-holding tank. As the system operates, water fills each tank and flows out the standpipes to the clarifier tanks in large systems or biofiltration tanks in smaller systems. Siphon tubes keep fish from swimming into the standpipes while allowing water to pass through side slots or side holes near the bottom of each tube. This system is equipped with two (2) types of siphon tubes; each serves a specific purpose as your fish grow.

Use the 112742 slotted siphon tube when fish are small. As fish grow and more waste is produced, replace the 112742 slotted tube or tubes with the 112743 tube with 1-1/8" holes. These holes help ensure a consistent water flow as the fish grow.



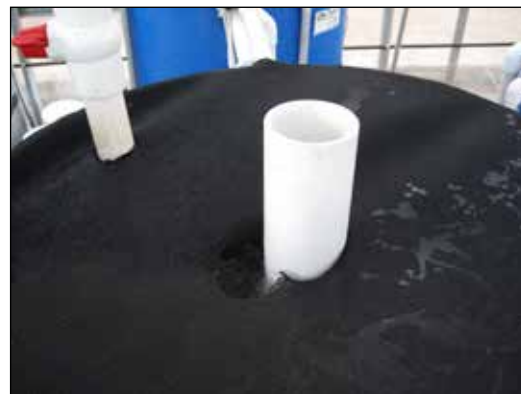
Photo shows the standpipe as installed inside the fish-holding tank. Air lines to aerator stones are also shown.



Siphon tube with 1-1/8" holes is used for larger fish.



1. Slide siphon tube down into tank and over the standpipe.



2. Carefully seat siphon tube inside tank. Length of tube must be above the water level in the tank. Tube can be trimmed to 1"-2" or so above tank if desired.



Photo (left) shows a slotted siphon tube for smaller fish.

Cover Fish Tanks

18

Fish can sometimes jump out of the holding tanks. For smaller fish, cover each holding tank with a couple layers of the 109758 netting that shipped with your system. For larger fish, a single layer typically works. It is always best to monitor tanks and fish to determine if additional net layers are needed to keep the fish in the tanks. Secure the netting to the top ring of the tank frame, or use other fastening methods to keep the netting in place. (Frame shown may differ from actual frame.)



NOTE: You can also cover a tank that holds small fish with primary and secondary filter material if some remains.



Actual frame design may differ. Sample system is shown. Your system may differ.

Maintenance: Flush In-Tank Standpipe

To prevent sediment buildup and fluctuations in water quality, flush the in-tank standpipe weekly.

Complete the steps that follow.

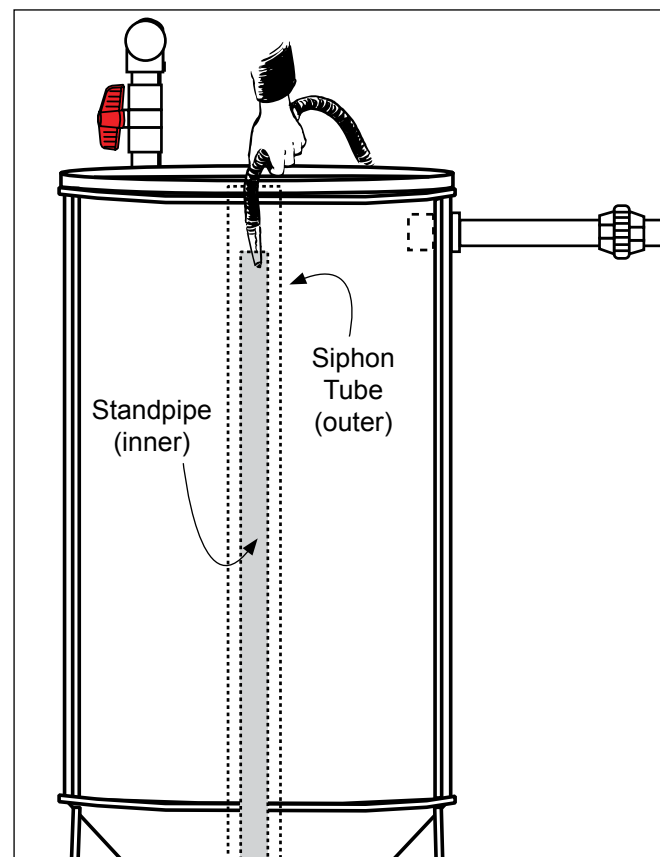
1. Turn off the water pump.
2. Attach a hose to the end of the drain pipe (A) if desired. (Depending on system size, there could be over 30 gallons of water.) Close the in-line valve (B).
3. Open the valve at the end of the drain pipe (A). Water will be dirty and contain sediment from inside tank and pipes. Capture and reuse the water for outdoor plants, or drain to waste.
4. Using a garden hose, flush the inside of the standpipe by spraying clean water down into the pipe. (Depending on system size, there could be over 30 gallons of water.)
5. Once water runs clean from the drain pipe, repeat the steps for each remaining standpipe in each fish-holding tank.
6. After cleaning, close the valve at the end of the drain pipe (A) and open valve B for all return lines leading to the biofiltration tank or tanks.
7. Turn on the water pump and check water flow at the biofiltration tank.

ATTENTION: Do not spray between the standpipe and the siphon tube.



Spray clean water from a hose down and **into the standpipe** to flush out sediment. Repeat this for all fish-holding tanks.

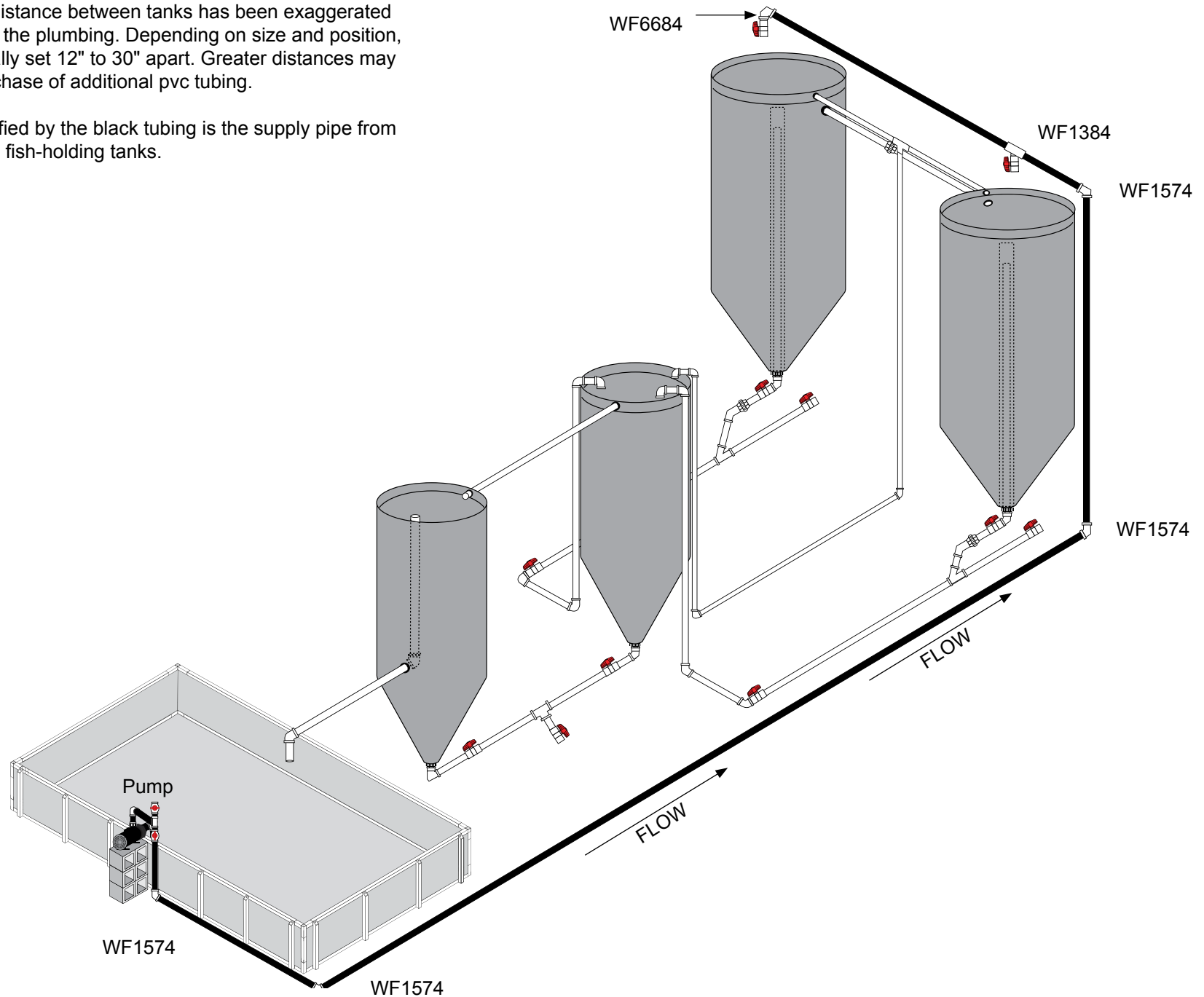
ATTENTION: Do not spray water between the standpipe and the siphon tube.



Full Profile: Supply Plumbing

ATTENTION: Distance between tanks has been exaggerated to better shown the plumbing. Depending on size and position, tanks are typically set 12" to 30" apart. Greater distances may require the purchase of additional pvc tubing.

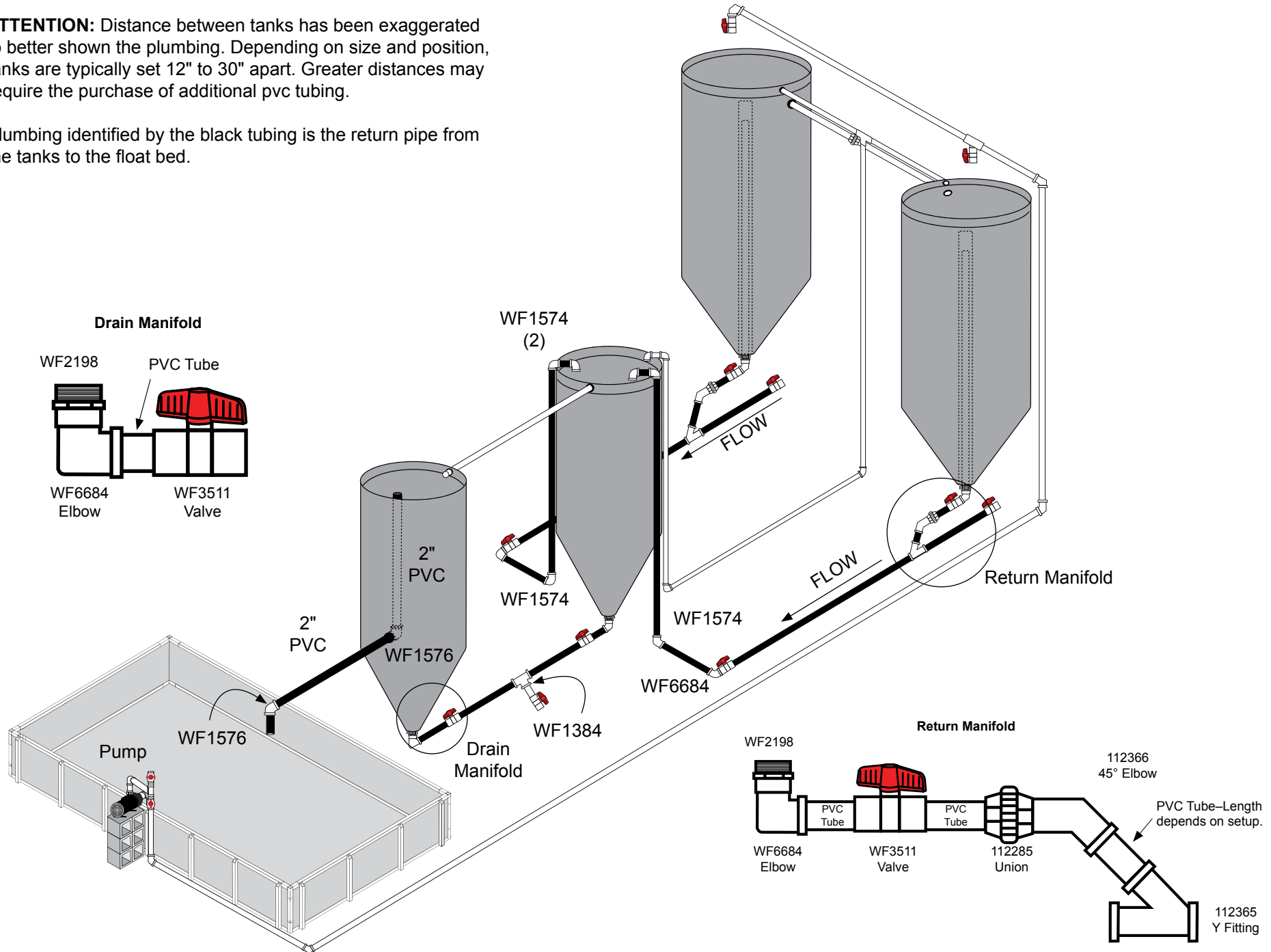
Plumbing identified by the black tubing is the supply pipe from the pump to the fish-holding tanks.



Full Profile: Return Plumbing

ATTENTION: Distance between tanks has been exaggerated to better show the plumbing. Depending on size and position, tanks are typically set 12" to 30" apart. Greater distances may require the purchase of additional pvc tubing.

Plumbing identified by the black tubing is the return pipe from the tanks to the float bed.

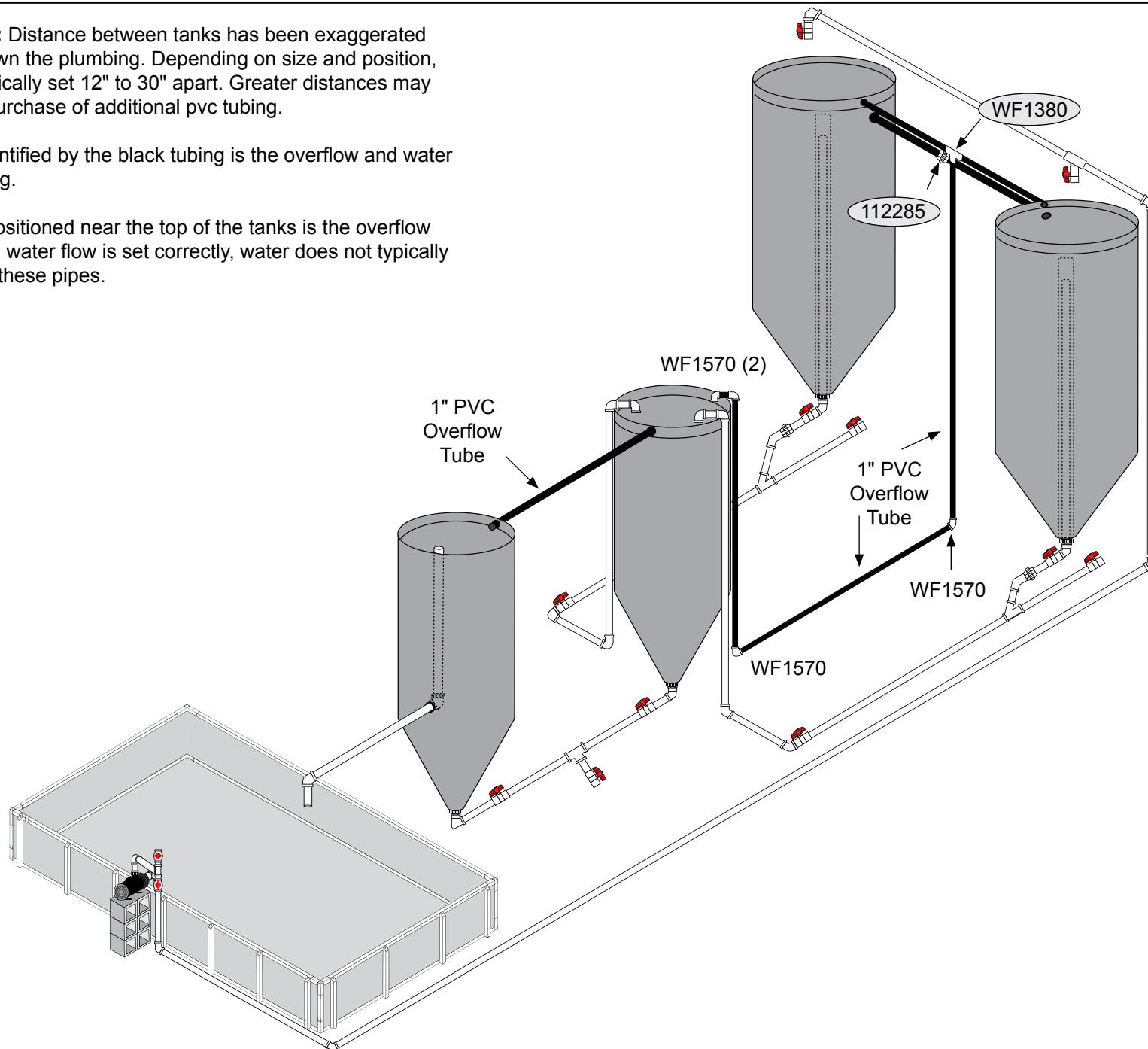


Full Profile: Overflow and Water Level Plumbing

ATTENTION: Distance between tanks has been exaggerated to better shown the plumbing. Depending on size and position, tanks are typically set 12" to 30" apart. Greater distances may require the purchase of additional pvc tubing.

Plumbing identified by the black tubing is the overflow and water level plumbing.

The 1" pvc positioned near the top of the tanks is the overflow tubing. When water flow is set correctly, water does not typically flow through these pipes.



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