

Zoeller Start Up Report

Section I – Project Information

- This section is listed to be filled out by the Installing Contractor, often it is not. You will want to fill in all of the information you can. If possible, include phone numbers.

Section II – Equipment Information

- Again, this section is listed to be filled out by the Installing Contractor. Sometimes it will have been filled in at the Zoeller factory before the equipment is shipped. Regardless of how you receive it, you will want to make sure it is filled in as completely as possible. Include all of the part numbers possible, this will pay off in the years to come when replacement items may be needed.

Section III – Installer Checklist

- Again this is a section that the Installing Contractor should fill out before calling you out for a startup. Many times this is not done. If it is completed, double checking all of this information is highly recommended. Let's go through it line by line to ensure there is no confusion on anything:
 - **Impeller turns freely by hand** – before the pump is installed it is recommended that the contractor attempts to turn the impeller by hand to ensure it's free and moves easily and freely.
 - **Pump rotation correct (3 phase only)** – this is something that should be checked once power is hooked up and pump wires are connected to the panel. This is the only for sure way to determine that the impeller is turning in correct rotation. The best way to do this is to tip the pump or lay on its side and use the HOA switch to turn the power on and then immediately back off while using a flash light to watch the direction of the impeller and compare to the rotation arrow on the volute of the pump.
 - **Equipment in good condition** – this would be good visual check of all the equipment, ensuring it has all arrive in good condition and no damage has taken place.
 - **Pit Clean** – a common issue that seems to happen at construction sites is the basin becomes the trash dumpster. This can have detrimental effects on pumps! We recommend when equipment is installed the basin or tank is cleaned of all debris, swept clean and then the cover sealed down until the time of startup. If that is not possible, it would be a good idea to carry a heavy duty pool skimmer to be able to clean debris out of the station before a startup is conducted.
 - **Check valve, discharge pipe and vent pipe installed** – this again is typically a visual check to ensure everything has been hooked and is ready to go. It is important to check things like direction the check valves are installed, that flanged fitting have had gaskets installed, solvent weld PVC pipe has been primed and glued, etc.
 - **3/16" vent hole drilled in discharge pipe** – this is something that will be required on any system that is utilizing a check valve. This should be drilled between the pump discharge and check valve, it is important to ensure the hole is drilled below

the cover and is inside the pit as water will come out of this hole when the pump runs. As a suggestion, if possible you may want to drill this hole at a 45 degree downward angle so the spray that comes out of it is directed down. A hole drilled straight in can tend to splash out when the pump is running depending on the configuration of the system.

- **Access cover/hatch installed** – this is something that should be fitted to the basin not only for safety but maybe required for some installations. It is important to know the cover you have ordered fits and works with your basin and pumps.
- **Panel securely installed and electrical connections tight** – here we want to ensure the panel has been securely and properly mounted to a wall, post or some sort of pedestal mount. We want to ensure all field wiring has been landed to the proper terminals in the control panel and is tight. It is recommended you tug on each wire to ensure it is tight or even use a screw driver to physically ensure a good tight connection has been made. A poor connection can result in a system not working or cause a failure.
- **Single phase starting capacitors installed** – there are many different models and types of pumps, some that require external starting components, some that have them built in and some that do not require anything. This check is to ensure you have correct set up installed. Generally if you purchase a Zoeller panel with your pump, you have some assurance everything is correct – but still should be double checked. Some cases other panels are used, there is nothing wrong with this as long as things such as starting components are checked and ensured they are installed correctly. A misstep here can result in a pump failure.
- **Short circuit protection ___ Amps** – here we are checking the supplied power has circuit breakers or fuses and they are rated for the full load amp draw of the panel. Fill in the circuit breaker or fuse size in this box.
- **Thermal overload protections ___ Amps** – Some panels and pumps require external overload protection, in these cases you will typically have to set this in the panel during the start up for the proper range of your pump and application. It is recommended you set these for the listed full load amp draw of the pump. In some cases it is acceptable to go as high as 10% over the full load amp draw listed on the pump. This would be done to prevent nuisance tripping in an application normally running at or near full load amp draw.
- **Proper wiring connected to controller ___ Gage ___ Length** – this is concerning the incoming wiring to the control panel from the building or facility. We would be looking for the proper size wiring for the full load rated amp draw of the control panel with consideration of the length. This may be an area where consultation with a licensed electrician could or should be recommended. Over given distances there is what is commonly referred to as a voltage drop. A situation such as this could show up in the voltage reading of the startup later on, but this is a good first step in heading off and correcting a potential problem before it happens.
- **Float positions from the bottom of the pit** – this is typically done with a tape measure and recorded in the boxes in this section for the correlating float switch. This may be measured during installation by simply measuring from the bottom up

to each switch or might be done afterwards by measuring from the top of the basin down to each float switch and subtracting from the overall depth.

Section IV – Startup Verification List

- This section will be a bit redundant to section III. Section III should have been checked over by the installing contractor, while section IV is to verify this information by the startup technician and the installer.
 - **To be checked by the startup technician with the installer's assistance** – this box is only intended to let everyone know assistance maybe required from the installing contractor.
 - **Discharge pipe installed ____in.** - simply to verify the discharge pipe size. This could be important to verify for the type of pump you are using. Example might be, you wouldn't want a solids handling pump that could pass a 2" solid in a 1 ½" discharge pipe system.
 - **Check Valve installed in correct location and direction** - this is to simply make sure you have verified location and direction of the check valve.
 - **3/16" vent hole drilled in discharge pipe** – simply to verify that the vent hole has been drilled. The easiest way to check this will more than likely be to just run the pump and look for the spray out of the vent hole.
 - **Pit Clean** – Again, looking for trash and debris in the pit. This is an extremely important step. Again if any debris in noted, it should be cleaned out. A pool skimmer works well, but in some cases in maybe required to have pumper truck or Vacuum Truck out to clean out the pit properly.
 - **Access opening large enough for pump removal** – this is another important check. Many times things such as a junction box placement are not considered in relation to pump removal. Sometimes a hatch cover has been used, but the way it is put together will not provide enough free space for the pumps to be removed. Wiring, pull cables, float switch tethering, etc. Here we just want to pay close attention to any obstructions that maybe in the way for pump or even float switch removal.
 - **Panel and internal wiring securely installed** –Begin by checking and ensuring no power is turned on to the control panel before beginning here, all think about safety first. Now begin this step by ensuring the control panel is mounted in a permeant and professional fashion. Make sure it is not solidly mounted. Check things like can you open the door of the panel and work in it in a safe manor. Watch for things like the panel opening and the opening of the basin cover. There are typically codes that dictate some installation requirements, it would be a good idea to get familiar with these in your local area. We also want to inspect all of field wiring in the panel once we feel good about the panel installation. Begin by verifying with a panel wiring schematic and pump owner's manual. Go over each of the wire terminals, ensure the correct wires are landed at each location and give each one a tug or verify with a screw driver that each connection that has been made is good and tight.

- **Panel and junction box interior dry & sealed** – this is often overlooked and the importance is not recognized until there is a problem. Remember that water and electricity don't mix and neither does moisture in a control panel or junction box – ensure power is turned off if either condition is noted. Water in a control panel can cause rust and corrosion of wiring terminals as well as the panel components. Water in a junction box can cause all kinds of problems, from wicking down the pump and float cords to shorting out and just causing all types of electrical issues.
- **Power supply cable length ____Ft.** – with this box we are looking for the cable length of pump power cord in feet. This will be your best estimation.
- **Float switches away from turbulence and hang-ups** – this is another extremely important step when conducting a startup. We want to verify the float have not be placed directly in front of the inlet pipe where a surge in flow could cause the float switch to swing around. We want to watch for how the float switches are hanging and make sure then won't be left in any manner that could cause a hang up or problem.
- **Low water level above volute top (#1 off switch)** – with this step we want to stress the importance of having the off float switch set above the point where the pump could draw air and potentially not shut off. In a perfect world we would recommend the float switches are set so that the pumps remain submerged at all times. In many cases this is not possible, so keeping the water level such that the cooling fins or motor is under water is best. You will want to look at the space you have between the inlet pipe to the basin and pump motors, this will be your workable space to set the float switches. Ensure you can keep a good run time for the pumps and short cycling will not occur.
- **Pumps respond properly to hand-off-auto switch** – we recommend the best way to perform this step is to first do it by turning the HOA switch to hand mode to verify the pumps come on and off. Next by putting the HOA switch in Auto mode and pulling up the float switches and tipping them up in order to verify proper operation. Another method that can be done is simply by running water in the pit and pumping it out with the panel in auto mode – be careful with this until you are sure they system is discharging water properly. Jumper wires could be used, but this does leave room for error – be careful with this method.
- **Alarm responds properly to test – off – normal switch** - most all of our control panels all have the alarm feature and the test –silence switch on the panel. If your panel has this feature be sure to flip the switch to the test position to ensure both the light and the sounder activate. Next by either raising the alarm float or with a jumper wire, activate the alarm and ensure the silence switch deactivates the sounder portion while the visual light stays on. The light will stay on until the switch is lowered or the jumper wire is removed or the situation has been cleared.
- **Panel matches pump horsepower** – here we want to verify the rating of the panel meet or exceed that of the pump. This is to verify all of the wiring and components are rated for the intended use.

- **Circuit breakers operational** – in this step we want to ensure power can be turned on and off with the circuit breakers. This is best done with a voltage meter.
- **Thermal overloads correctly set to match name plate amps** – If your panel is equipped with thermal overloads they hopefully have been set in Section III by the installer, but again should be verified. Our suggestion is to set the overloads for the full load rated amps of the pump. Again in some situations, it could be acceptable to go as high as 10% over the rated full load amps.
- **Operator has installation and maintenance manual** – here we want to verify the owner/operator has all of the information about the pumps installed.
- **Operator has control panel schematic** – this is to ensure the owner/operator has all of the control panel paper work.

Section V – Electrical Readings

- In this section, we will be taking live readings of both the voltage and amperage – use any appropriate safety measures and exercise caution. This section is divided into two parts, single phase and three phase, you will only be completing the one that applies to your system type. You may want to cross out the section you will not be competing to help avoid any confusion.
 - **Single Phase Section**
 - **Voltage supply (Pump off)** – This will be measured by a volt meter at the incoming power block or terminal block. Many times this will be the same for pump one and pump two, but depending on your particular panel it could be separate supplies and terminals. This reading is taken with the pumps shut off. Voltage is to be measured with one lead on L1 terminal and the other on the L2 terminal.
 - **Voltage supply (Pump on)** – This will be done just the same as the above step but this time with the pumps running. If a voltage drop is happening, this is typically where it will show up. A drop of a few volts is typical and not an issue. If the drop is more significant it may require corrective action.
 - **Amp draw (pump on)** – this will be measured with an amp probe or amp clamp with the pump running. Amps can only be measured one leg (one wire) at a time. Amps will generally fluctuate a bit as the pump comes up to speed and then as it pumps through the various points of the pump curve, so you will have to watch it for a minute and use the reading where things seem to stabilize at. This will be done for L1 and then L2 for each pump.
 - **Three Phase Section**
 - **Voltage supply (Pump off)** – This will be measured by a volt meter at the incoming power block or terminal block. Typically all three phase panels will have only one incoming power terminal block, this is where these readings will be taken. These readings will be taken with the pumps shut off. Voltage will be measured from line to line across all line, L1 to L2 then L2 to L3 then finally L1 to L3.

- **Voltage supply (pump on)** - This will be done just the same as the above step but this time with the pumps running. If a voltage drop is happening, this is typically where it will show up. A drop of a few volts is typical and not an issue. If the drop is more significant it may require corrective action.
- **Amp draw (pump on)** – this will be measured with an amp probe or amp clamp with the pump running. Amps can only be measured one leg (one wire) at a time. Amps will generally fluctuate a bit as the pump comes up to speed and then as it pumps through the various points of the pump curve, so you will have to watch it for a minute and use the reading where things seem to stabilize at. This will be done for L1 and then L2 and then for L3 or each leg of the three phase power for each pump. Please note, with three phase, electric motors can be wired such that they will run backwards. Many times the pump will have a higher amp draw and be very noisy if in this condition. To test or correct this condition, with the power off, switch any two of the three legs. For example take the wire from L1 and move it to the L2 terminal location and then put the wire from L2 to the L1 terminal. Turn power back on and try again.

Section VI - Functional Test

- This is a very easy and simple test that can be done in the field to verify a number of things. By performing a functional test, you will have great confidence that the system is working as it was originally designed and spec'd and then installed. To do this test, you will need a stopwatch, a tape measure, a supply of water in the basin and preferably done at a time with little or no flow coming into the basin.
 - To begin, fill the basin up with enough water to run a pump for period of one minute. If this is not possible, you may use less water by only running the pump for 30 seconds or even 15 seconds and then multiply it out for a one minute period.
 - Start by using your tape measure and measure from an easy point, typically from the edge of the cover down to the surface of the water. Write this measurement down.
 - Now, using the control panel's HOA switches, start one of the pumps in hand mode and the stopwatch at the same time and run the pump allowing it to discharge the water through the installed discharge piping system.
 - When one minute is up, simply shut the pump down with the HOA switch. Now use your tape measure and re-measure the water level from the original point. Write this measurement down and subtract from your original number. This will give you the number of inches of water you actually pumped out in a one minute period.
 - Now use your tape measure and determine the diameter of the basin installed and either look up on one of our charts or calculate the number of gallons per inch in your particular size basin holds. Once you know the gallons per inch, multiply times the number of inches your pump removed in the one minute period. You will now have the gallons per minute number.

- Now with this gallons per minute number, get out the Owner's Manual that was in the box your pump came in or supplied pump curve that came in the packet on your pump. Use your gallons per minute number and compare with where that falls on the chart. Follow that point over the left side to see what the TDH would be at that gallons per minute. This will provide you with an estimated TDH number.
- Fill in the GPM and TDH boxes for each pump under the functional test section of the startup report. This should be compared to the original documentation any big discrepancy between the original numbers and what was actually determined should be looked into.

Section VII – Summarization

- This is simply any area to record any issues or noteworthy items. This is good place to make note of any deficiencies or any work still needing to be finished or looked into.
- Sign and date
- List all that were present during the start up
- Distribute copies of the startup report to all parties including a copy to be sent back to Zoeller to activate your warranty. Please be sure to keep copies of all your startups yourself as well. If any questions come up once received at Zoeller, we will attempt to contact you with our thoughts, options or suggestions.