Case Study #4

Install Date – 10/25/2024

Rheem – Type: Vertical System / Location: Office closet / Condensate Pump / AC Power Adapter Used / Dispense Interval set to every seven days

Background:

This system is in an office “closet”.

Previous system copper tubes were left hanging (why?)

(these were cut off above and taped closed)

Cutoff switch directly in a drain outlet.

There is no trap, even though there is a label on the unit stating not to run the system without a trap.

This is not uncommon…

The condensate line feeds directly into a condensate pump, however, even with just two feet of total length of pipe the line was susceptible to clogging.

Why?

FYI: the AC fan/blower switch was in the “On” position instead of the “Auto” position, so the fan was running 24/7 – for who knows how long?

Issues:

The condensate pump was sitting on a paint can – with no secondary pan in case the pump fails.

There was a mounting screw on the plywood for the pump hanger but for some reason the pump was off one of the screws – and sitting on the paint can…?

The reason for the clogging – **a terrible drain line design.**

Looking at the left picture, this one drain line has **six** 90-degree couplings! There is nothing worse in a drain line than a right-angle turn to slow the condensate flow and provide a spot for bacteria to take hold and grow.

Minimizing the number of 90-degree fittings or eliminating them completely should be a priority in a drain line design.

The slope of the pipe that is sitting on the plywood is basically zero (flat), so water will sit inside this section of pipe providing an environment for bacterial growth. Adequate slope of the drainpipe(s) is critical to the flow of condensate. *Ideally, as fast as condensate is generated inside the cabinet, the condensate should exit the cabinet and flow expediently to the exit location, which in this case is the pump. A trap/vent combined with adequate slope should always be used if possible.*

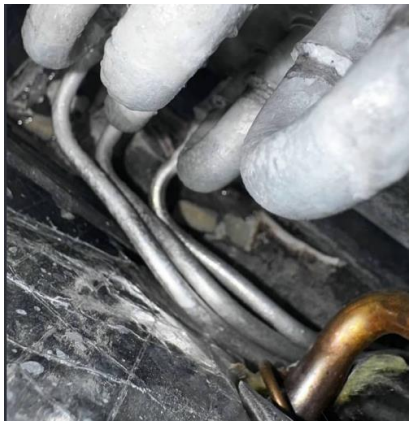
Combining six 90-degree couplings with little slope is a perfect recipe for clogs.

Examining the pipe showed bacteria that would have caused the clogging:

This is that "flat" section of pipe:

What's the drain pan look like?

The front of the drain pan had a layer of Zoogloea and some clumping bacteria around the drain outlet. But neither were enough to cause a clog (yet).



When this system clogged, the clog was most likely always in the drain line.

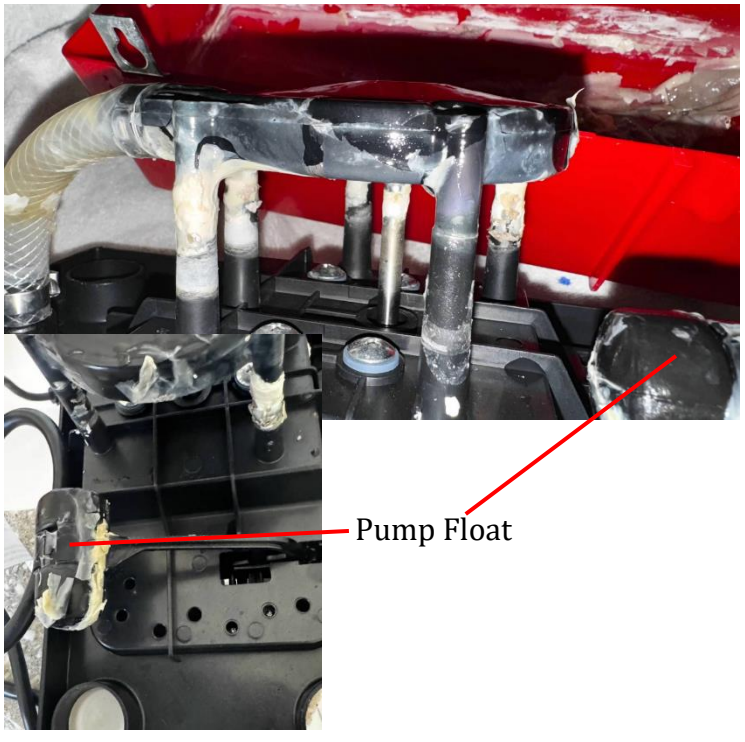
To keep the system running during a clog, the 90-degree elbow on the drain outlet was pulled off (wasn't glued) and the condensate would drop into a bucket, so the drain pan outlet was not clogged.

The drain pan was thoroughly cleaned:

What's the inside of the pump look like?

I put gloves on for this…

Pump and Float:



The pump was thoroughly cleaned.

A plastic container was used to house the pump, so if there is a future pump failure water will be held in the container.

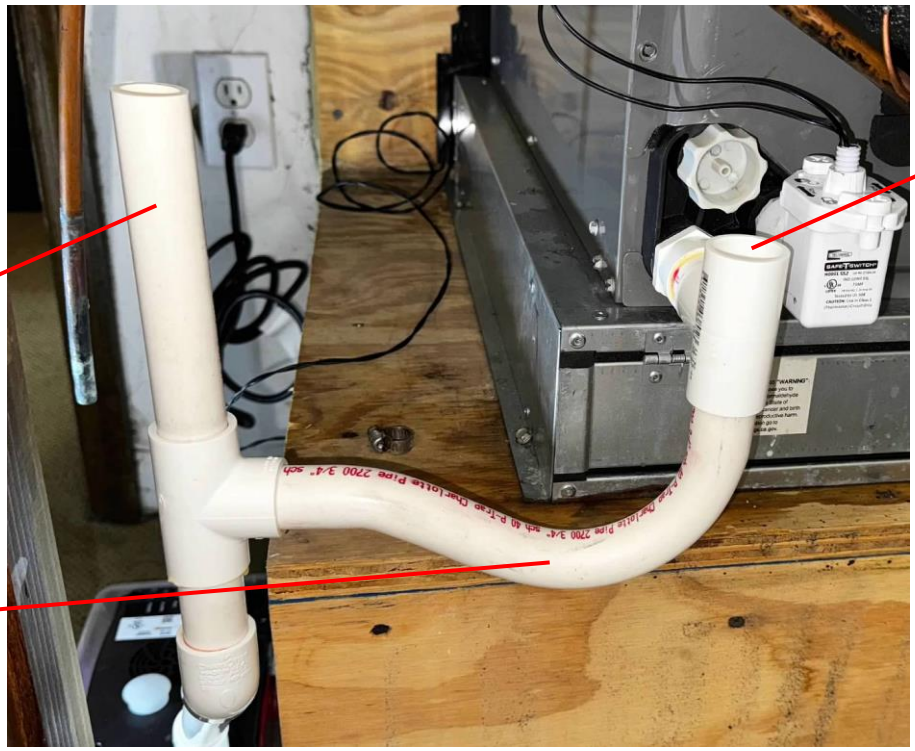
A second safety cutoff switch was added to shut down the AC system on a pump failure.

Drain Line Rebuild

The drain line was rebuilt using the classic "Cleanout, P-Trap, Vent" combo.

Only two 45-degree elbows were used instead of 90-degree fittings.

The drain line was previously piped into the far side of the pump where this time the drainpipe was inserted into the close side of the pump, so less total pipe required – and less length is always better.



Vent Pipe

P-Trap

Cleanout Port

(A short pipe and a cap was added later)

This shows the drop from the vent to the pump.

The two 45-degree fittings provide no resistance to the condensate. The water will free flow straight down into the pump housing.

Compare the new flow path to the previous design with six right-angle turns!

A coupling was used at the pump opening to support the piping weight. The length of pipe exiting the bottom side of the coupling and entering the pump is 3/4". The condensate will drop out the drainpipe into the pump housing.

The new cutoff switch was connected in series with the primary cutoff switch (either switch tripping will shut down the system).

This completes cleaning of the system and rebuilding the drainpipe system.

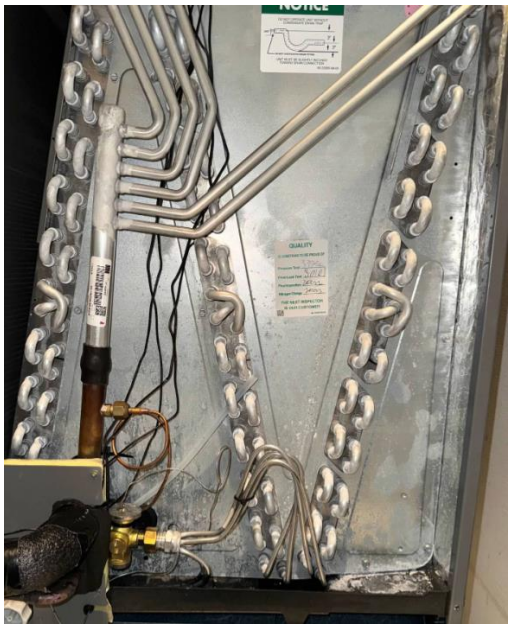
Adding a trap to allow the condensate to exit the drain pan expediently and a direct drop into the pump should eliminate any drain pan and drainpipe clogging, combined with the Zoog Zapper dispensing sanitizer every seven days. A trap should have been used and was not difficult to implement!

The trap should occasionally be vacuumed out as the trap is the most likely location for bacteria to try to take hold.

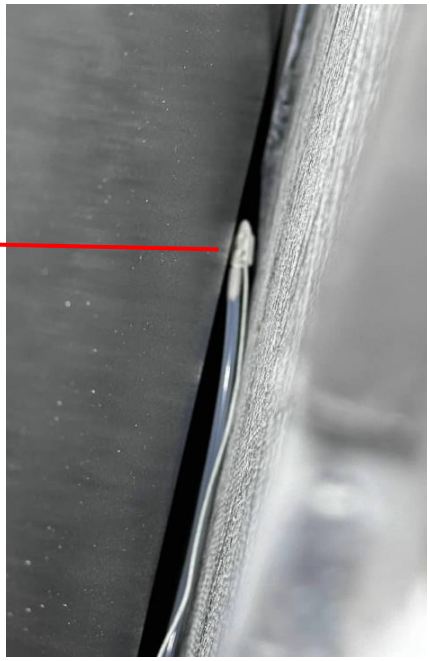
Zoog Zapper Installation

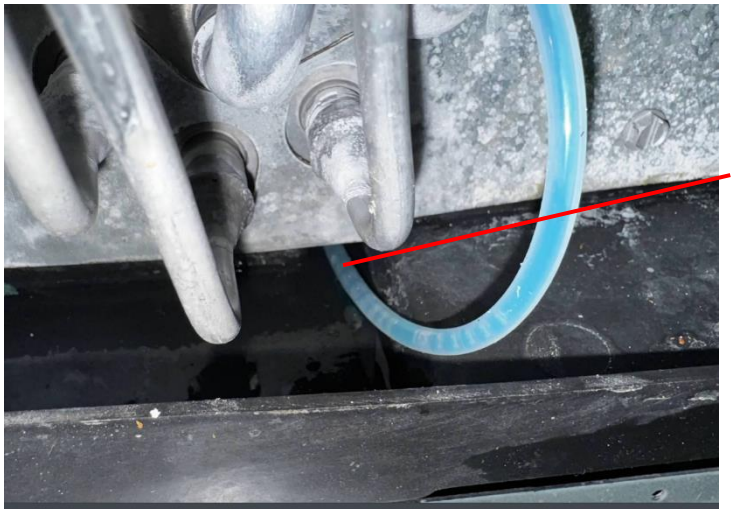
Next the Combo Fitting was installed. The Combo fitting will pass the dispense tubing into the cabinet. Rheem's have spare drain pan port (red plug) that is used for the Combo Fitting installation:

This system is an "N" configuration with one coil on the left side which deposits condensate into the left drain trough, and the other two coils forming a "V" and share a second common drain trough.



For the left drain trough dispensing, the Single-Port Nozzle was placed onto the top side of the coil using the placement wire to reach the far-back corner.

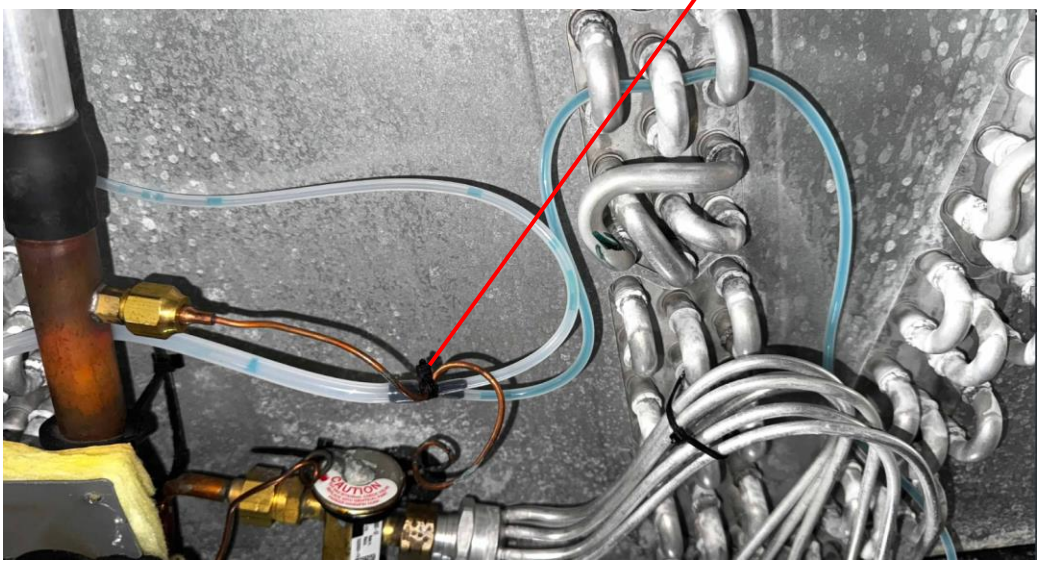




For the right-side drain trough dispensing, the Single-Port Nozzle was inserted into the drain trough directly using the placement wire.

The dispensing tube extends all the way to the rear of the drain trough providing maximum sanitization.

The two small dispense tubes connected to the Two-Port Manifold (splitter):



The unit was mounted on the left side of the cabinet and the pump was moved to the right side of the Reservoir Holder, so the pump is accessible from the front:

Power is from the plug-in AC Power Adapter:

Completed install with the trap section insulated:

The system dispensing - https://youtu.be/svOab84SD_M

Another successful Zoog Zapper installation!

Total time 2:10 hours

(System install was 25 minutes, the rest of the time was cleaning and replumbing)