Hi Gary,

My solar project is mostly done, so I thought I would send you some pictures and descriptions as you and your website are what inspired me. I'm located in Castle Rock, Colorado just South of Denver -- lots of good sunny days.

Overview:
My drainback system consists of six 8 ½'x4' solar panels mounted on the roof and a 490 gallon 2x4 and plywood tank in the basement. The panels around mounted on my 30 degree slope roof and pointed due south. I would like to have mounted the panels on a steeper tilt, but high winds and the Architectural Control Committee made that impossible.

I picked the panels up off Craigslist for $220 each. They were probably 15 years old but had never been used. The panels did not have a manufacturer name but they were built well enough with an aluminum extruded frame, 1" headers, ½" risers, and copper absorbers painted black. So while I admire those who build their own panels I thought it best to stay with these panels as they are lighter than anything I could build, this important when mounting on the roof in snow country, and I needed good looks to pass muster with the dreaded architectural committee for the sub-division.

As the panels were bought I will skip any further write up on them.

The tank design was based on your plywood, EPDM liner design.

The modifications I made to you original design were the following:

I kept the tank 4’ high, shortened the wall length by 8”, but kept the base the full 8’ in length. This extra 8” of plywood on one end provided me a base for creating a support for the pump.

I extended the long sides of the tank walls past the end wall and I believe this provides much more support. Note how the vertical 2x4's clamp the extended plywood and the end 2x4's can be screwed into by both the long side and the short side.

Inside corner of tank without extra corner piece that Gary and others have added. This piece is not needed because of the extended side walls. This square corner makes fitting interior 2” insulation easier.

I also did not use any glue (or expanding foam) to adhere the interior insulation to the walls. Just cut the foam so it fits tight and the water pressure will make sure it stays in place.

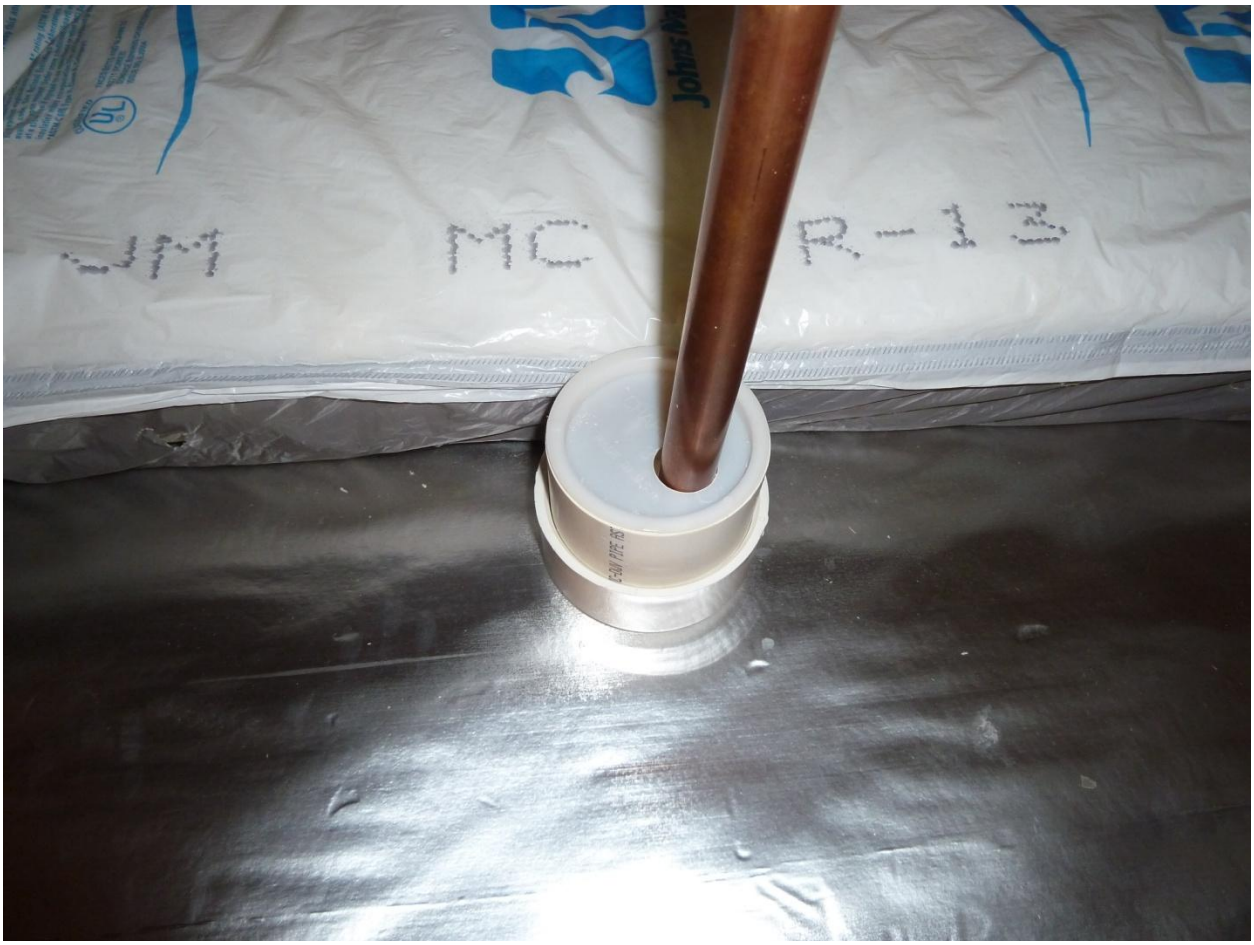
In addition to the 2” polyisocyanurate insulation on the inside of the tank, I added fiberglass batting between the 2x4 framing. As the spacing for the framing was not conducive to standard batting width, I created some structure from 2” polystyrene insulation. I held this in place with expanding foam. The plastic casing of the batting was attached to the foam with spray on adhesive.


Johns Manville
Johns Manville
Johns Manville
11 5:05PM

As a finishing touch I covered the walls with white water resistant wall board. On the lower corner of the end wall you can see the tank output which will go to the pump.

The lid is a layer of EPDM wrapped around 2” of polyisocyanurate and stapled (with stainless steel staples) to a sheet of 1/2” plywood. The small wooden blocks are for attaching the lid walls. On top of the plywood I put another sheet of 2” polyisocyanurate followed by a layer of r13 fiberglass bats (r39 total).

This shows the lid and the solar panel return line. I decided to run the pipe straight through the lid and when I need to remove the lid I unscrew the short length of copper pipe. Having a straight shot like this improves the ability to break the syphon.



The return access hole though the lid is limited in size with a modified pipe cap.

The inside connection of the access hole is a floor drain flange siliconed to the EPDM material.

The pump is a Taco 009 with built in speed controller and temperature sensors. My head height was roughly 31', and my measured flow rate maxs out at 7 gpm. It would be nice to have slightly higher rate but stepping up to larger pump was going to be a lot more money.

The output valve has an adapter to support a garden hose so I can easily drain the tank to the basement floor drain.

Note the plywood support I added to support the pump and output pipe.

Flow meter is scaled from 1 to 10 GPM and provides a visual indication of the water level in the tank when the pump is not running. The dual probe thermostat provides a temperature reading from the top water level of the tank and the output port at the bottom of the tank.

The thermostat has logging but only when in an alarm state. I can set the thermostat alarm range so it always logs (96 hours worth) but when alarming it beeps every few seconds. Future alarm disable switch will be a future project. Tank had only been run for a day and that is why the temperature is so low.

The right side connection with the ball valves is the return from the solar panels. I used PEX-AL-PEX for the connections between the solar panels on the roof and the solar tank in the basement. As the lid was off during this picture the piece of pipe that extends into the tank has been removed.

The upper ball valve allows me to add water to the tank. The lower valve is not really required except when you need to pressure test the system.

The connections on the left are the lines between the existing gas fired hot water heater and the solar tank heat exchanger.

300’ of 1” PEX being used as a heat exchanger to preheat the water prior to going to the gas hot water heater. I used Arizona’s Ken’s 3 coil design (many thanks for doing the hard design work) but I used zip ties rather than polypropylene twine as I was not a boy scout or sailor, so knot tying is not one of my strong suits. The trick to using zip ties and PVC pipe is drilling holes in the end of the pipes so the zip ties have something to attach to. I did use some polypropylene rope to tie a couple of bricks to the bottom of the coil so the assembly stayed vertical in the tank.

To make the PEX to copper connections easier I used hot water heater flexible connections.

As the plastic deck board was 1” thick I slightly flattened the 3/4“ copper pipe that passes through the board so I would only have to cut ¾” slots through the board.

Obviously 192 sq ft of panel is a little over kill just to heat my domestic hot water. Future plans call for a modification to my hot tub.

The tank can hold 490 gallons but currently I have it only filled to 454 gallons. The cost difference in the tank construction is minimal and it is always easier to reduce water rather than increase tank size.

And for those wondering this has project so far has cost me around $4500; but it was never about the cash and more about the experience.

More solar projectswww.BuildItSolar.com