

# Big Projects Water Heater



74 Gallon A.O.Smith Water Heater to be Replaced by Tankless Water Heater (Rinnai OEM)



Tankless Water Heater (Rinnai OEM) Replaced with a Thermal Expansion Tank below

Comparison Items	74 Gallon Tank Water Heater	Tankless Water Heater
Size & Weight	26.4" (Diameter) x 57" (H), 280 lbs	14" (W) x 22.9" (H) x 9.6" (D), 51 lbs
Gas combustion (BTU/hour)	75,100	180,000 (max) to 9,900 (min)
Connections	1" Cold & hot water, 1/2" Gas	3/4" Cold & hot water, 3/4" Gas
Time lag until getting hot water	Relatively short (Hot water in tank)	Longer (Cold water must be heated up)
Gas consumption efficiency (See consumption history below)	Burner on every time cooled down	Burner on only hot water needed
Quantity of hot water output	Up to tank capacity (Limited)	Endless (Infinite)
Maintenance	Flush, Anode rod replacement	None
Noise	Popping, Banging	Quiet

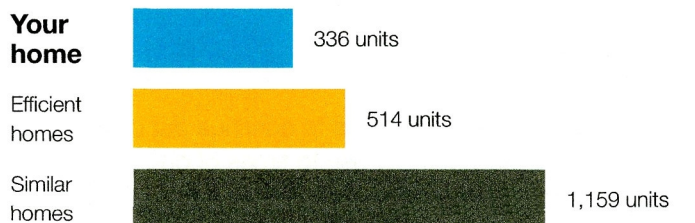
**Comparison between regular water heater and Tankless water heater**



**Monthly Gas Consumption History**

The actual operation of tankless water heater started on July 18, 2014. The tankless water heater operated in full period in August and the gas consumption was down to only 4 therms. This number sustains year around even in Winter, coldest season, although 27 therms was consumed in December, 2013 under regular water heater operation due to frequent heat-up water in the tank to keep hot water temperature predetermined.

**Here's how you compare**



Jun 17, 2020 - Jul 15, 2020

You're compared with 85 homes within 1 mi that are similar size ( sq. ft.) with gas heat. Efficient homes are the most efficient 20% of this group. You can view your home information at [pge.com/energycheckup](http://pge.com/energycheckup).

**Energy Check up by PG&E**

**Great**

- Good
- Using more than average

**35% less energy** than efficient homes

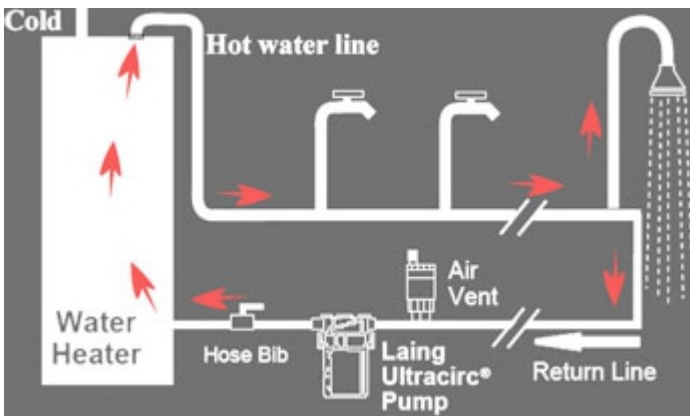
In conclusion, regular water heater with tank is not economical.

## Hot water recirculation

Hot water recirculation is also an undesirable way and not economical. Recirculation pump must be in active all the time to recirculate hot water from farthest pipe routing point into water heater tank. This route also collects sediments and scales built up in all the way of copper pipe and stores them in the bottom of the tank as a result. The drain valve (green knob below) for sediments bleeding is deteriorated and clogged. It incurs flush disability.



Copper Pipe Routing for Hot Water Recirculation with Circulation Pump (at center right)



The purpose of hot water recirculation is to keep the hot water temperature high even in copper pipe routed every where all the time.

Hot Water Recirculation Diagram



Sediments, Scales & Anode Rod Deposited in the Tank

The sediments and scales in the tank generate popping and banging noise when burner is on.



1" and 3/4" copper pipe and fittings, Propane torch x 2, Torch head with extension hose, Tubing cutter, Wire brush, Abrasive mesh cloth, Lead free solder, Flux with brush, Gasket sealing compound (for gas valves), (Flint spark lighter not shown)

When 1" copper pipe soldering, I had to use two propane torches at the same time to get enough temperature. Copper piping is a sort of an extended way of electronic parts soldering that is related to one of my life term favorite hobbies (amateur radio, computer, and so forth).

# Moving out



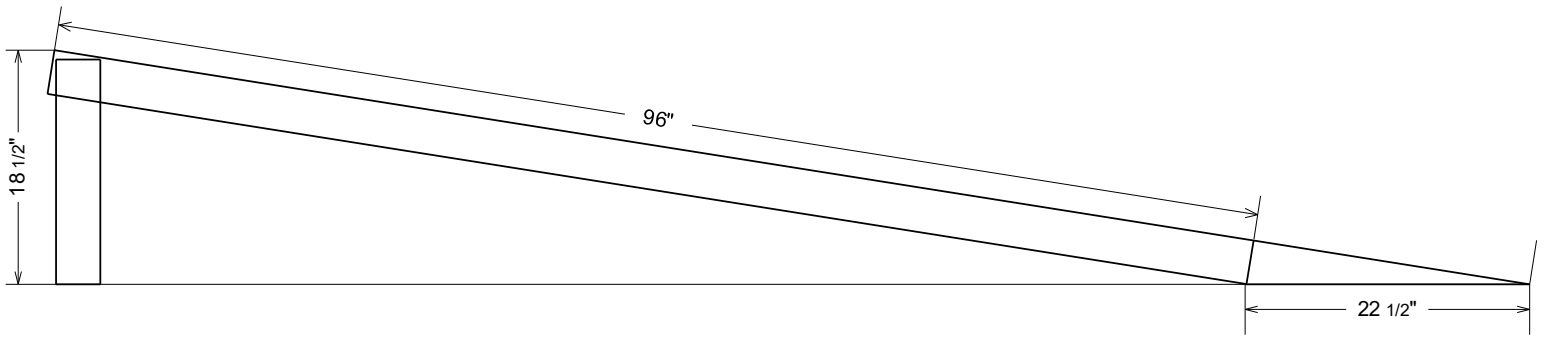
Disconnected



Moved out

74 gallon water heater is big (26.4" (Diameter) x 57" (H)) and heavy (280 lbs) and resides on the stable and sturdy rack which height must be 18" above the floor to reduce the risk of ignition from flammable sources.

It is not easy to move 280 lbs water heater down to the ground by two or three people from limited narrow place. To make it easier, I designed and made a wooden slope below.



**Wooden Slope**





Diagonal Cut to a Half for Leading Edge Portion



Rigid Supports Power Distributed to Four Sections

Four triangular woods for leading edge portion of the slope were cut out from two 2 x 4 timber (22 1/2" length) using my own way of diagonal cut method by table saw.



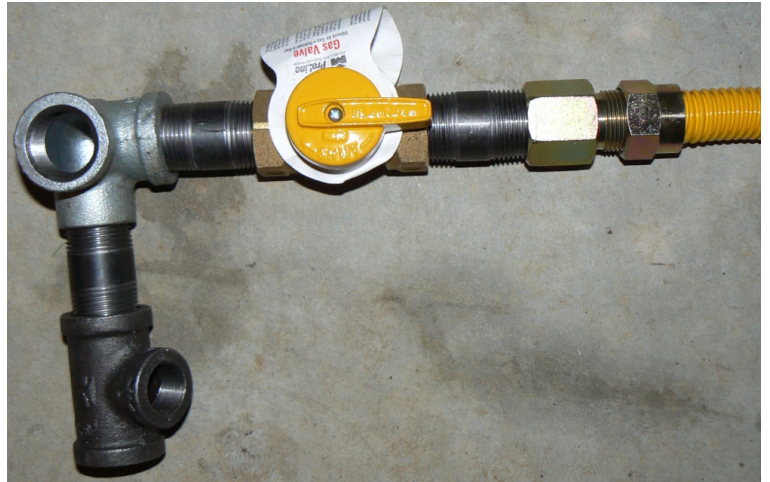
Total Appearance



## Replacement



Tankless Water Heater Connection (Tentative)



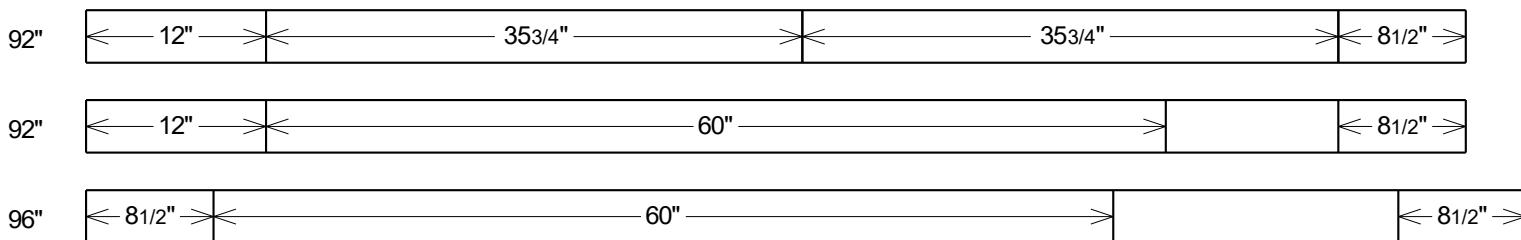
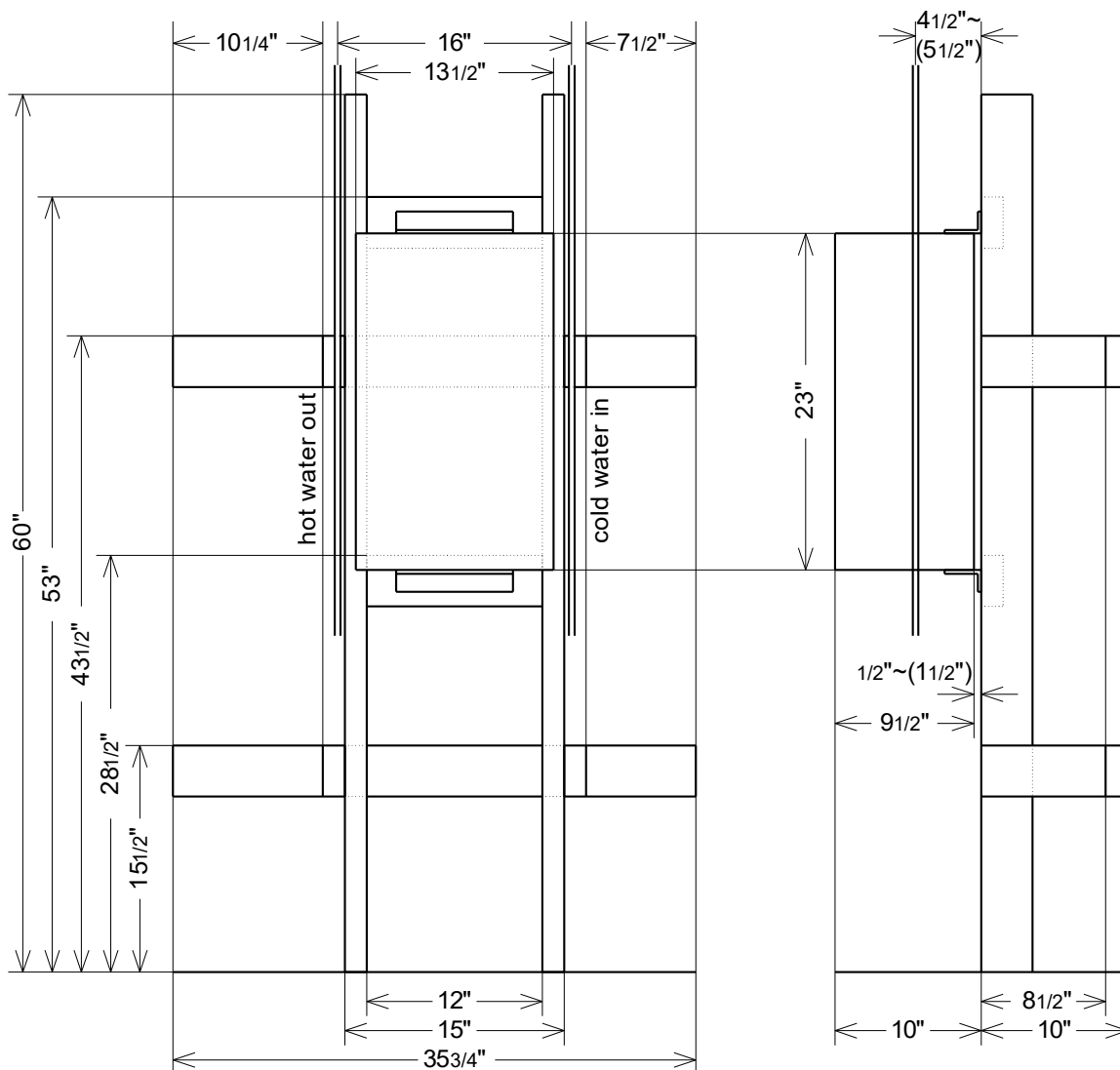
Natural Gas Line Connection (Tentative)



Tankless Water Heater Attached to Wall



Copper Pipe Routed & Connected



### Tankless Water Heater Support

I made wooden support for tankless water heater to get an exact position with existing water inlet & outlet copper pipe and the chimney measuring the precise mutual distance as above. This wooden support eased my entire replacement work so much.



1" Water Shut off Valve Replaced



Chimney with Cap Attached

At last stage of the replacement work, a water shut off valve broke. Because I did not predict handling 1" copper pipe at the beginning, I had to use two regular propane torches, 180 degrees apart, at the same time.

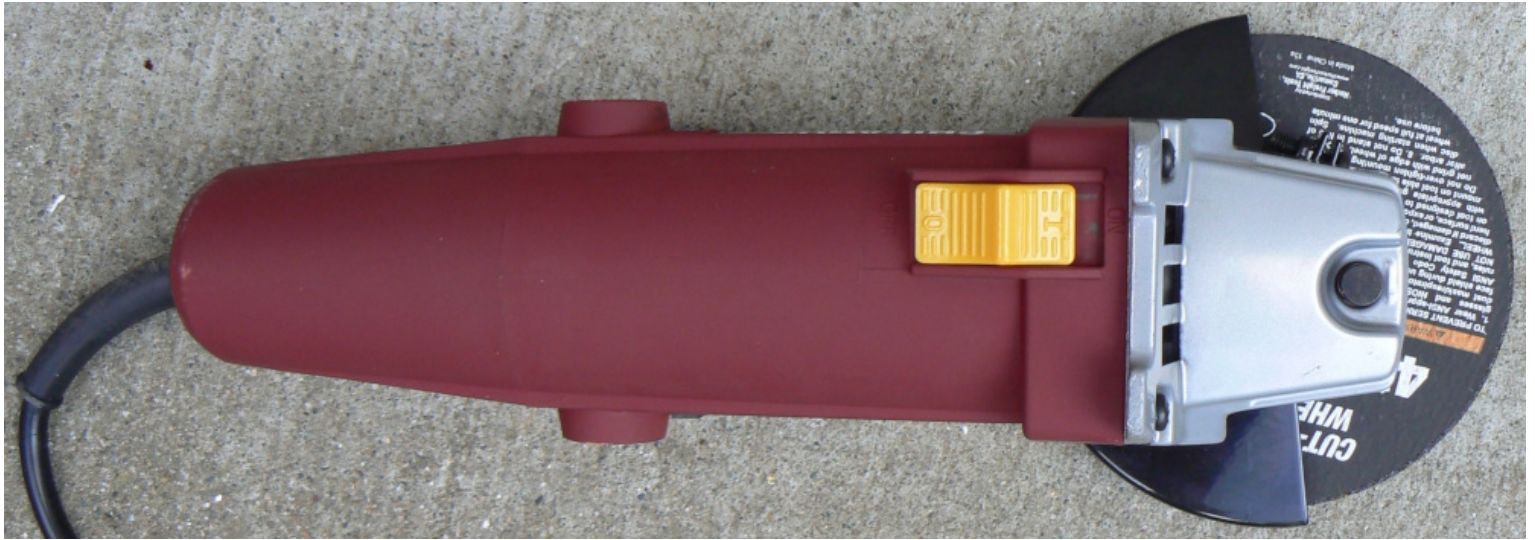


Connection at Bottom with Pressure Release Valve & Cleaning Valves,,,

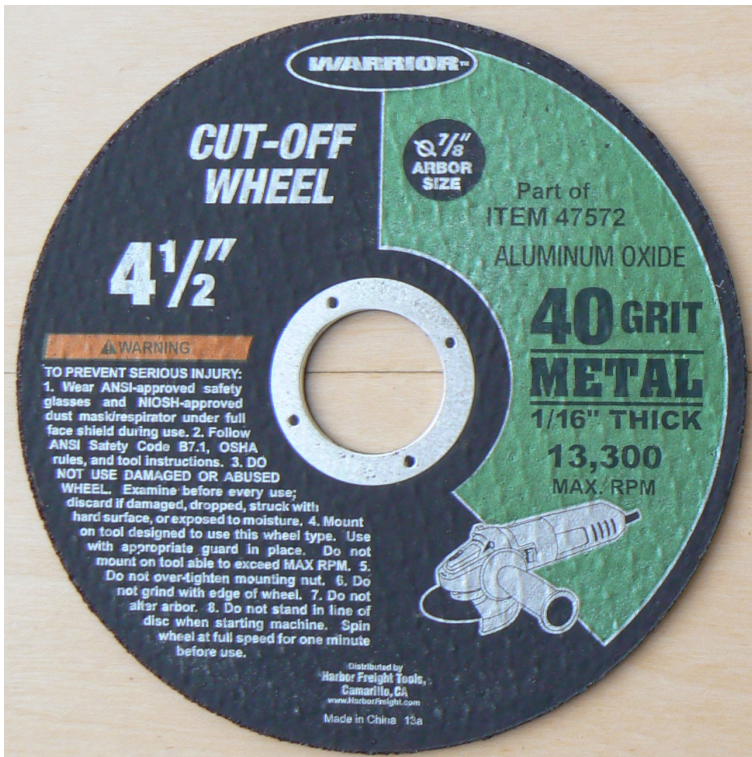


Replacement Done

# Anatomy



4 1/2" Angle Grinder



Cut-off Wheel for Cutting



Cut-off Wheel Attached to Angle Grinder



700 LBS Hand Truck with 13" pneumatic Tires & Ratcheting Tie Down

To move the 280 LBS water heater sliding on the slope, I used the hand truck above binding the tank by ratcheting tie down.



Moved to Outside for Anatomy



2" Thick Heating Insulator



Pressure Release Valve Hole



Flush Drain Hole



Water Outlet Hole



Water Inlet Hole

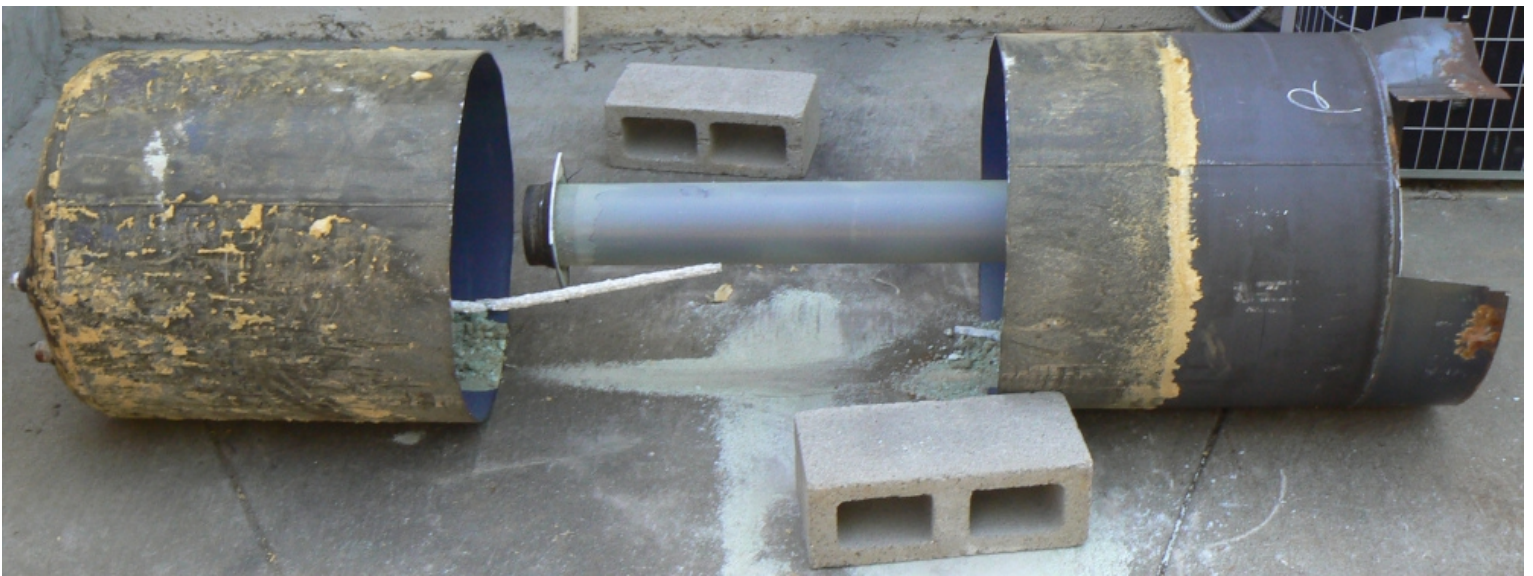
All of the holes are rusted and filled with sediments and scale. As the result, the diameter shrinks.



Pressure Release Valve



Burner, Lighter, and Sensors



Cutting, cutting,,,,





Miserable. Replacement was totally right and a must!