Intro to Gas Water Heaters Training Flyer

One type of product we sell a lot of is water heaters. Because of that it is important we all have at least a basic understanding of the how they work and the main components used. There are two main types of water heaters: Gas and Electric. This flyer is intended to serve as a brief overview of a typical gas water heater and how it works. There are Standard Gas Water Heaters and another type called a Powervent Gas Water heater for residential use. This flyer will only cover the standard residential gas water heaters.

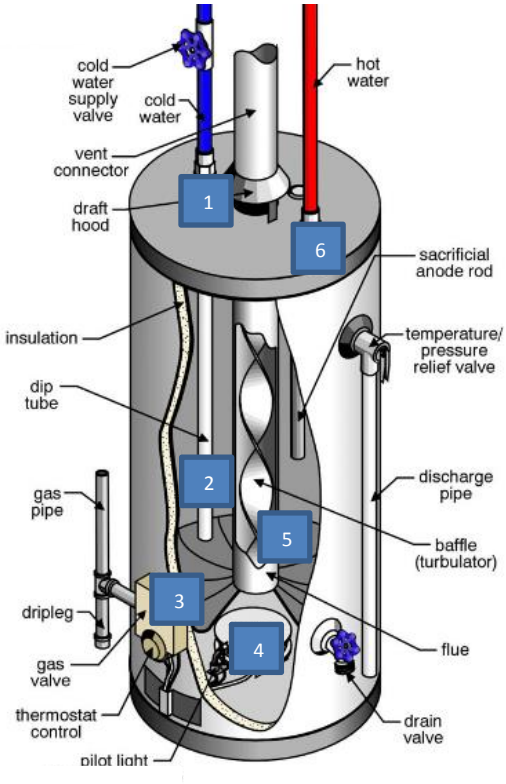
The Tank:

Both electric and gas water heaters have similar tanks. The inner shell of a water heater is a heavy metal tank containing a glass lining. The glass lining is to stop the metal portion of the tank from developing rust. They typically hold 40 to 60 gallons of hot water at around 50 to 100 pounds per square inch (PSI). The exterior of the tank is covered in an insulating material such as polyurethane foam and over that is a decorative outer shell and possibly an additional insulating blanket.

How does a gas water heater work?

Below is a step by step walk through of how the typical gas water heater works when there is a call for hot water in a home for a typical residential heater.

1. Cold water enters the water heater at the cold water inlet.
2. Water travels down the dip tube where it enters the tank near the heat transfer surface.
3. A water heater's thermostat controls the temperature of the water inside the tank. Normally, it can be set anywhere between 120 and 180 degrees Fahrenheit. The thermostat senses a drop in temperature below the temperature set point.
4. The gas control valve releases gas to the burner, which resides beneath the water tank. At this point a pilot light will ignite the gas in the burner.
5. The flame heats the heat transfer surface and begins to raise the temperature of the water, and the exhaust gas from the burner is vented through a flue that rises up through the middle of the tank.
6. As the water heats up, it rises to the top of the tank and leaves through the hot water outlet. The hot water outlet is at the top of the tank, so it is always drawing the hottest water in the water heater.



Thermal expansion will occur as the water rises in temperature. Please see the Expansion Tank Flyer for more information on that topic.

Anode Rods:

There is also something called an anode rod inside the tank. It is a metal rod made of magnesium or aluminum that's formed around a steel core wire. They are designed to attract corrosive elements in the water, thereby diminishing corrosion in the possible vulnerable small sections of exposed steel in the liner.

The Gas Valve, Thermopile, and Pilot Light:

Now that we have a basic overview of how a gas water heater works it would be good to cover the gas valve and pilot light in more depth. Let's use an example of a typical residential Bradford White gas water heater installation.

When the water heater is first installed there is no pilot light burning. To light the pilot, a customer will need to hold the button on the gas valve down, in the pilot position, and press the piezo ignitor (square red button). They should continue holding down the knob until the status light changes from red to green. When this is done it causes something called a thermopile to ignite the pilot light while ensuring it stays lit. **Water heaters with thermopiles tend to take a little longer than those with a thermocouple to ignite. This means the customer will need to hold it down a little longer.*

After being set to a designated temperature, the gas valve is now responsible for controlling the release of gas into the burner to maintain the water temperature to the set point. To do this, it needs it needs some amount of electrical current. In our typical residential gas heaters, the thermopile converts some of the heat energy from the pilot light into millivolts of electrical energy which powers the electronics in the gas valve. If the pilot light goes out, the thermopile stops supplying the gas valve with power and it shuts off. This is a safety feature to stop the gas flow if the pilot light goes out.

Make Up Air:

A gas water heater uses a flame to heat water. That being said, it needs to have access to draw new air in to replace the air lost through the flame and exhaust. If a customer is having issues with the pilot or burner it could be caused by either too much or too little make up air. A customer can adjust for this by adjusting the air shutter on the bottom of the heater.

Trouble Shooting:

Lee & Bradford White provide a few great options for trouble shooting and diagnosing issues with a water heater. Below are the top three:

- A customer can call one of our Branches and talk to one of our Inside Sales Team Members.
- They can also go to the Gas Water Heater Trouble Shooting Page on the Bradford White website. There are many great resources available there.
    - http://www.bradfordwhite.com/troubleshooting
- Bradford White also has a Technical Service Help Desk Phone line available 24 hours a day, 7 days a week.
    - 800-334-3393

Next Steps and a Couple Questions:

The next step is to learn more. The video below details the Bradford White Icon Valve in more detail and discusses some of its features.
https://www.youtube.com/watch?v=Vj5N4aWOOjE

TRUE or FALSE: Anode rods are used to help the incoming cold water reach the bottom of the tank.
TRUE or FALSE: Bradford White has a Trouble Shooting Phone line that is open 24/7.