

About Hot Water Boilers

At one time the hulking mass in the basement that heated the home with hot air or steam was known as the furnace. Today, a furnace moves air and a boiler produces steam or hot water.

Oil fired boilers are constructed of steel or cast iron. Cast iron boilers are made up of sections, which are large hollow rings stacked together, like a box of donuts. The water to be heated is inside the rings, and the burner is mounted to blast its flame into a firebox(sometimes called a refractory) fitted into the hollow created within the sections. Steel boilers can be of the same design or be of stamped steel welded together to form the sections or water chambers.

Gas burns at a lower temperature than oil, and gas boilers come in a variety of designs. They can be similar to oil boilers, but usually put the flame closer to the metal, even immersing the water tubes in the fire. Some gas burners have a blast tube, similar to an oil burner, but most use atmospheric burners. This type of burner uses the pressure of the gas forced through an orifice to mix with air and create rows or fire, similar to the burner in a gas oven or grill.

Hot water boilers have many accessories to perform properly. An aquastat serves two purposes. It controls the temperature the boiler operates at, and provides a low voltage transformer and relay to control the circulator. More than one circulator requires additional relays or a multiple control panel. Water pressure is limited by a valve known as a regulator. A check valve or backflow preventer stops water from migrating into the domestic supply should the pressure inside the boiler become greater than the domestic water pressure. A temperature-pressure relief valve vents the system if the water pressure or the temperature exceeds the designs of the boiler. Water expands and contracts as it is heated and cooled, necessitating an expansion tank.

Since it is impossible to hermetically seal the heating system, automatic or manual air bleeders must be integrated into the circulating loop. A circulating pump moves the hot water through the heat loop. If multiple zones are desired, a circulator is needed for each loop, or one circulator can be used with zone valves. Zone valves will open and close with the call from the thermostat, as well as turn the circulator on. If each zone has its own circulator, a flow check valve is required to prevent the flow of water by convection or by another circulator. Domestic hot water can be produced in two ways. A tankless coil (a coil of copper tubing with aluminum fins attached) can be immersed into the water jacket to create allow a heat exchange. A hot water maker is a storage tank with a coil inside through which hot water from the boiler is circulated for the heat exchange. Hot water cannot be drawn directly out of the boiler because it may contain anti-freeze or corrosion protecting chemicals.

Steam boilers are identical to hot water boilers in construction, but operate at different water levels. A hot water boiler is filled with water, and a steam boiler is not. In order to make steam, the water is kept below the top of the water jacket. A float valve with a sight glass automatically regulates the water level. Steam moves through the pipes to the radiators under its own pressure. As the steam passes through a radiator it cools and condenses into water, then gravity returns the water to the boiler to repeat the cycle. Many of the hot water boiler controls are not needed: circulator, flow check valve, and automatic bleeders.

The most common fuels are oil and gas, but wood and coal can be used, as well as electricity. Electric boilers differ from the rest because they do not require a firebox. The electric heating elements are immersed directly in the water.