

# MODULE 4: HEATING

## OVERVIEW

In module 4 we will study a variety of common boilers. A boiler is a heating device for heating water primarily for space heating.

The other system that is commonly encountered is electric heating. This includes the electric resistance heating such as the electric furnace and heat pumps. Both use electric power as its power input source.

## BOILERS

Early boiler systems were primarily for heating only and were composed of hot water or steam. Boilers are often preferred for large homes because hot water carries heat over a long distance more economically than warm air. Additionally, water piping requires a lot less space than duct work and pumps are typically much more efficient than fans in moving large quantities of heat.

## HYDRONIC SYSTEMS

Where a boiler or water heater is used to enable heat energy to be transferred into water or convert water to steam, both of which act as the heat transfer medium. Many hydronic systems are also radiant systems. Hot water or steam is circulated through registers or even through pipes imbedded in the floor, which then radiate heat into the surrounding space. Baseboard heaters are also very common.

Hydronic heating system designers' typically use of heat exchanger types – convectors or radiators, radiant surfaces or forced air.

## HOT- WATER HEATING SYSTEMS

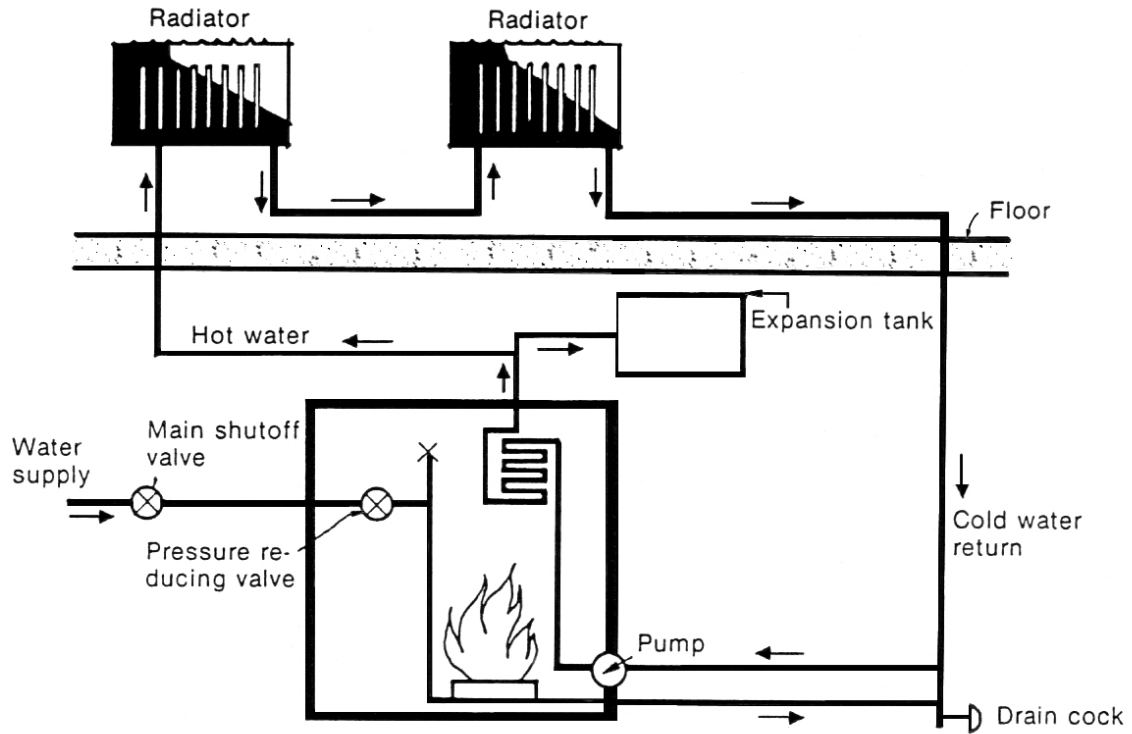
Although hot-water heating is common in bigger buildings, it is not widely used in newer homes except in certain regions of the country. In hot water heating systems, water is heated in a boiler to a temperature of about 80°C (176°F), then pumped through pipes and circulated throughout the house. After giving up heat to the house through radiators, the cooled water returns to the boiler and the cycle starts over again.

The boiler water temperature on some systems is kept constant by an aquastat. When the house thermostat calls for heat, the circulating pump is activated and the water is moved through the piping system in the house. After the temperature of the air in the house reaches the thermostat setting, the pump shuts off.

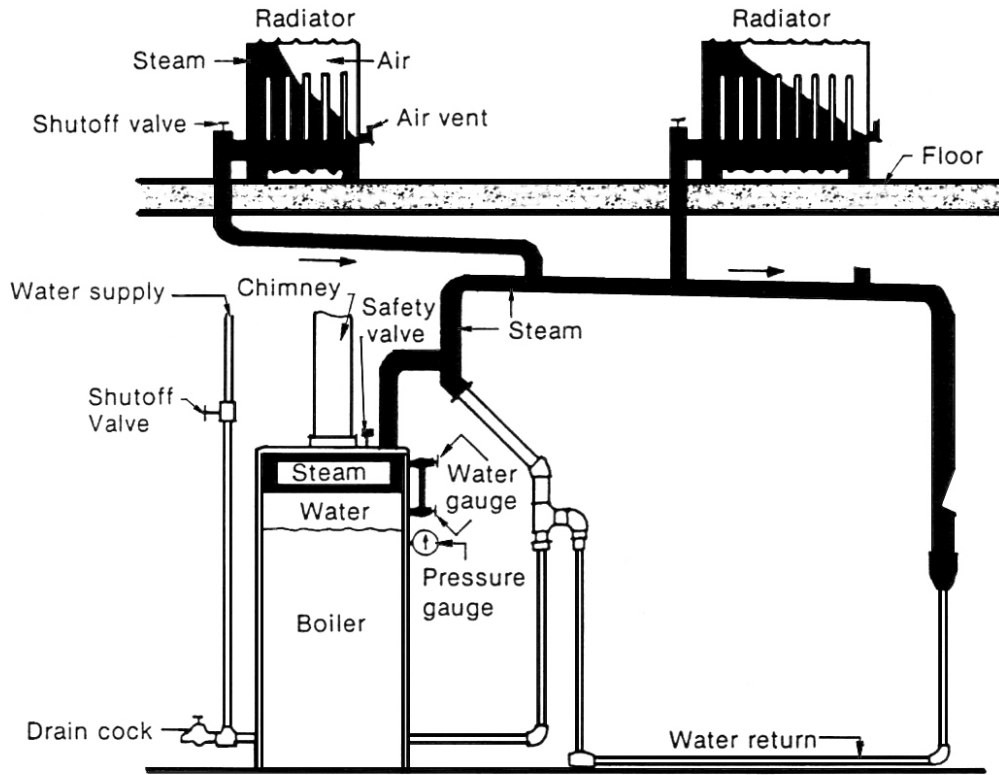
Other systems work on the same principle as a forced-air system. On these systems, the water temperature in the boiler is not kept constant (although it may be kept at a minimum temperature by the aquastat). When the thermostat calls for heat, the boiler increases the water temperature and the pump distributes the water through the system. The pump may be activated by the burner coming on, or may be activated by a water temperature sensor in the system. Once the thermostat has been satisfied, the burner shuts off; however, depending on the system, the pump may continue to run until the water temperature drops down to a preset value.

Some older systems do not have a pump and simply work by gravity. The system has an expansion tank to prevent pressure built-up as the water temperature increases. The expansion tank is partially filled with air-which compresses as water expands.

# HVAC for HOME INSPECTORS



**Hot Water Radiator System**



**Steam Radiator System**