



Are you considering a new hot-water boiler?

Boiler options for hydronic heating systems can be divided into *non-condensing* boilers and *condensing* boilers. Non-condensing boilers typically use cast iron heat exchangers and have efficiencies in the 70-83% range. These boilers use air in the house for combustion-air in the burner. These boilers usually maintain an average supply water temperature of 180° F and require at least 140° F return water temperature to prevent flue gases from condensing within the boiler.

Newer designs of hot-water boilers are called condensing boilers. They are capable of efficiencies in the high 90s. These boilers achieve greater efficiency by extracting additional heat from the flue gases before they discharge out the vent.

Additional efficiency is achieved by modulating the burner output to a level that varies with the outside temperature. These newer boilers are also called “mod con” boilers because they “modulate” the burner output and they intentionally “condense” the water vapor out of flue gases for increased efficiency.

Here are a few tips to consider when making the decision to replace an older existing boiler:

- Condensing boilers use draft inducer blowers to move the cooler flue gases out of the boiler. Non-condensing boilers use the wasted heat to lift the gases up the chimney without the need for the blower.
- Condensing boilers use electronic, outside-air reset controls to modulate the burner based on how cold it is outside. Non-condensing boilers operate at a fixed setpoint temperature of about 180° F.
- Condensate pumps, piping, and acid neutralizers are needed for condensing boilers but not for non-condensing boilers.
- Many existing boilers are oversized by up to two times what is required to adequately heat the house. Right-sizing the boiler typically requires a technician or engineer to perform a heat-loss study of the house.
- Some codes require that hard-wired, carbon monoxide detectors be installed near the boiler wherever a new condensing boiler is installed.

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- Condensing boilers are a great choice where radiant floor, wall, or ceiling heat is utilized. Radiant heat uses a steady supply of low-temperature water to circulate through embedded PEX or copper tubing. Condensing boilers are most efficient when used where low-temperature (90-110° F) supply water is needed.
- Operating a condensing boiler at high water temperatures will forfeit the expected energy savings. High water temperatures will not allow the flue gases to condense and give up the large amount of heat gained when the gas changes into a liquid.
- Night-setback thermostats can disrupt the steady-state heat output performance of a condensing boiler. The condensing boiler needs to constantly heat the house, using the lowest temperature water by modulating the burner output, based on the measured outside air temperature.
- Most condensing boilers are wall-hung, not floor-mounted units. This will usually free up some floor space where the old boiler was but will require wall space to mount the boiler and its associated components.
- All boilers require periodic maintenance. In most cases, an annual service frequency is recommended. The service provider may recommend that a longer or shorter service interval is acceptable based on field observations.



A typical, wall hung condensing hot-water boiler



A typical hot-water boiler

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