



How do I pick a boiler?

Boilers today offer a wide range of customized options to maximize efficiency. If your boiler has an old pilot light that's always on, you're probably a good candidate for a replacement boiler, or at least a retrofit. Alaska's many heating days justify paying for the most efficient system possible upfront, since the extra money you spend for efficiency gains will be paid back several times during the system's operating lifetime.

But remember—there is no single perfect system because of the number of variables involved, such as sizing, fuel type, and control options. Looking for an “Energy Star” label is a good start, but it doesn't stop there. Make sure that the contractor you hire to install or retrofit a system is aware of the fine details and performs the necessary calculations. These calculations are especially important if you're installing the sophisticated components and sensors required by today's most efficient boilers.

First, the basics

Boilers heat water, which is pumped throughout a system of pipes and radiators that conduct heat into your rooms. Boiler efficiency is measured by annual fuel utilization efficiency (AFUE). New boilers are required to attain a minimum AFUE rating of 80 percent, which means 80 percent of the heat generated is useful heat, rather than heat that escapes up the chimney. AFUE ratings have limits because they do not account well for heat loss from boilers that maintain operating temperatures throughout the day. Also, AFUE does not measure heat loss from boilers or pipes located outside insulated living spaces such as attics, basements and garages. AFUE also doesn't account for room heat that escapes out of open flues. Nevertheless, AFUE is the basic standard.

Step 1: Pick a distribution system

One major decision when installing a boiler is the distribution system. Most boilers are connected to a baseboard loop system, which is a series of low-profile fin-tube radiators that distribute heat along the length of a pipe in a room before returning water to the boiler. The supply water temperature to this kind of system is between 165-180 degrees Fahrenheit. Although if a house has a generous amount of fin tube, you may be able to heat it with lower-temperature water.

Just about any boiler is compatible with this type of distribution system: high mass, low mass, and even a condensing boiler (though it won't operate in condensing mode at these high water supply temperatures, it will perform as well as a non-condensing boiler).

Another distribution option is a radiant floor heating system, where loops of pipes are placed into your sub-floor to heat from the floor level up. This arrangement can produce more even heat throughout a room because the whole floor space can be crisscrossed with pipes rather than just pipes running along the baseboard area. The water temperature required in these pipes is between 80-130 degrees Fahrenheit. These low-water temperature requirements are precisely the ingredient needed to make a condensing boiler operate at its most efficient level. A condensing boiler can operate at low water temperatures where a non-condensing boiler dare not go.

A radiant floor system also has the benefit of producing more thermal comfort—which translates into fewer arguments over whether the room is too hot or cold—because more of the heat is felt in the living space instead of rising to the ceiling.

Step 2: Pick a boiler

So the type of boiler you install—a standard combustion or condensing unit—depends on your distribution system. A condensing boiler is more efficient (with AFUE ratings of 90 percent or higher) but also more expensive.

These boilers generate more useful heat by extracting energy from the flue gas and condensing the water vapor created by the combustion process. One reason they are more expensive is because they require a stainless steel heat exchanger and a way to drain the condensate.

Boilers that purge system heat at the end of each operating cycle help to minimize wasted heat by reducing off-cycle convective losses up through the flue as well as jacket losses to the boiler room. A boiler fitted with an outdoor reset, which senses outdoor temperatures, can increase efficiency by reducing the boiler system's water temperature as low as possible while still meeting a home's heating demand. Other fuel-saving strategies include installing a setback or programmable thermostat that regulates heating according to your daily schedule. Zoning, in combination with two or more thermostats, can regulate which parts of your house are heated depending on use.

In a tight house, sealed combustion systems can help avoid boiler backdrafting, which can bring poisonous gases inside your home. These systems require an exterior air source and a dedicated vent.

Retrofits

Want to improve an existing boiler instead of replacing it? Your options will vary depending on the system's age and the type of fuel used. For example, installing vent dampeners that close off a boiler's access to the chimney when it isn't operating can reduce standby heat loss. Electric ignitions eliminate the need for continuous pilot lights. Some older boilers that might have been oversized initially can be de-rated to burn less fuel while providing sufficient heat.

Whether new or old, proper sizing and design of a boiler system is critical and is best performed by a professional.

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