

Determining the Best Boiler to Meet Your Needs



When determining which boiler is right for a facility, there are many important points to consider. The first step is selecting a boiler design from options that include: industrial watertube, firetube, condensing hot water, electric, etc. A facility's particular application and capacity needs often drive the boiler design decision. After deciding on the boiler design, there are three factors to take into account: fuels, emissions and efficiency. All three impact boiler system performance and can affect long-term boiler operating costs.

From an operating perspective, fuel costs typically account for approximately 10 percent of a facility's total operating budget. It can be advantageous to purchase a boiler with a combination burner that can burn two fuels independently, for example, oil or natural gas. A dual-fuel burner enables a facility to take advantage of "peak time" rates, which substantially reduce the cost of a therm of gas when operating "off peak" by merely switching to the backup fuel. Dual fuel capability is also beneficial if the primary fuel supply must be shut down for safety or maintenance reasons.

Emissions standards for boilers are becoming increasingly stringent due to new EPA rules and state legislative mandates. The ability of a boiler to meet emissions regulations depends on the type of boiler and burner options. Cleaver-Brooks has options to meet sub-5 ppm NO_x requirements and other options to meet 10 ppm CO. Cleaver-Brooks can also custom engineer selective catalytic reduction (SCR) for more rigorous emissions control. Noncompliance with these regulations can be expensive both from an outage and penalty perspective.

The term "boiler efficiency" is often substituted for combustion or thermal efficiency. True boiler efficiency is the measure of fuel-to-steam efficiency. Fuel-to-steam efficiency is calculated using either of two methods, as prescribed by the ASME Power Test Code, PTC 4.1. The first method is input-output, which is the ratio of British Thermal Unit (BTU) output divided by BTU input x 100. The second method is heat balance, which considers stack temperature and losses, excess air levels, radiation and convection losses. Therefore, the heat balance or "In Service Efficiency" calculations for fuel-to-steam efficiency is 100 minus the total percent stack loss and minus the percent radiation, convection, and cycling losses. It is important to properly evaluate a boiler's "In Service Efficiency" as this number gives a more accurate view of how a boiler will perform throughout day-to-day operations, and not just at high-fire and 100% capacity.

Ultimately, boiler system performance is based on the ability of the boiler, burner and controls to work together seamlessly. The efficiency of the boiler is based in part on the burner being capable of operating at optimum combustion levels. Burners not properly designed or fitted to the furnace will produce unacceptable levels of excess air, CO or soot, thereby fouling the boiler and substantially reducing efficiency. In addition to the boiler and the burner, the controls included on the boiler entailing the burner management system, combustion controls, oxygen trim, etc., can greatly enhance efficiency and reduce overall operating costs. A complete packaged boiler design includes the boiler, burner and controls as a single engineered unit, and Cleaver-Brooks is the only manufacturer that offers a fully integrated boiler room solution.

To learn more, click [here](#).