

# THE Locomotive

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## Qualified Boiler Inspectors Can Have a Positive Impact On a New Installation or Retrofit

By James F. Wainwright

### Objectives

Whether installing a new or retrofitting an existing boiler, there are certain objectives that you as the owner want to ensure are met when the job is done. Your boiler inspector may be in a position to help you achieve them. Among the objectives are:

- The right size for the heating load;
- Proper operating and safety controls are installed;
- Sufficient clearances and overall installation is satisfied;
- High efficiency and low fuel cost;
- Minimal training needed to operate;
- Easy to maintain; and
- Fewer operating certificate hassles.

### Pricing/Costs

Note that price is not included as an objective. Let's talk about price for a moment. While we all want the most for our investment dollars, there are factors that may result in a higher overall cost of a boiler installation. Some of these factors may include:

- **Too small a boiler** may result in continual firing. That would stress the equipment and it is probable that a premature failure may be anticipated. In addition, there may be insufficient heat to provide adequate overall comfort control for the building occupants when colder temperatures prevail.

- **Too large a boiler** results in frequent cycling. Once again, this can stress the equipment and potentially result in control and/or equipment failure. Smaller modular units may be considered that could allow for future building expansion and the addition of more boiler units to match the overall building heating demand. Also, modular units can permit alternating the primary boiler among others. Alternating boilers can balance the work carried by any one unit and allow repairs to one unit while the remaining units continue to fulfill the heating demand.
- **Omission of operating or safety controls** may not only expose personnel to a significant hazard, but may result in a catastrophic property loss as well as potential litigation. In addition, incomplete controls may eliminate an important redundancy that could save the boiler from a failure and an extended loss of heat to the building. Controls and safety devices are not a place to make cost cutting measures by installing fewer than that recommended by the manufacturer and the jurisdiction, or using those of a questionable reliability.
- **Lower efficiency boilers** may cost less initially, but could end up costing far more after only a few years due to much higher fuel bills. Higher efficiency boilers should provide some type of assurance as to the fuel consumption over the life of the unit. Higher efficiency boilers may pay for themselves (over a current installation) within a relatively short time — maybe even within five years or less.
- **Piping that has not been insulated is another area of inefficiency.** An old steam boiler system may have had asbestos insulation removed when a new boiler is installed. However, the piping was not insulated when the installation was finished. Bare steam piping results in condensate formation, water hammer, erosion, harder working boiler, and poorer heating at the radiators. All too often a hot water heating system's piping is not insulated resulting in severe Btu loss and insufficient heat being delivered to where it is most desired. Not insulating piping is an area of cost reduction that will increase the overall operating cost by higher fuel bills and cooler radiators.
- **Training should always accompany the installation** of a new or retrofit boiler. This is not a time to read the manual or learn-as-you-go in order to save money. There are very specific procedures to follow when first starting the boiler at the beginning of a heating season as well as shutting it down at the end of the season. Also, boilers should not be shut off when a building is to be unoccupied for extended periods and then turned on high to rapidly bring the system up to temperature quickly. Proper training ensures operators visually check and test controls — knowing what to look for and how they will work when they are needed.

- **Maintenance requirements** are another item that should be included following the installation. Understanding and incorporating maintenance up front rather than letting it go until something fails will help defer potential costly emergency repair visits. A service contract with a heating contractor or a fuel oil supplier may help assure continued uninterrupted heating throughout the winter. There are items that may be anticipated as part of routine maintenance; e.g., cleaning or replacement of water level sight glass, servicing of low water cut off controls, replacement of pressure reducing make-up feed water valves, replacement of safety/relief valves (never try to repair a safety or relief valve), repair of control or valve or pipe connection leaks, lubrication of circulating pump motors. Note that the installation should permit easy access and allow the work to be completed without being hindered by insufficient space.
- **The bottom line** — it is important to have the installation monitored during the planning and construction phases by the boiler inspector. The boiler inspector may help communicate to you areas that could be overlooked, that may cause equipment difficulties, and could even cost more to operate. Meeting the objectives described above, along with proper monitoring during the planning and construction phases of the installation, should enhance your ability to obtain an operating certificate.

## **Case Studies**

Here are just a few examples in which the boiler inspector helped both the owner and the installer create solutions and a more reliable boiler installation.

### **Buried Piping**

A new steam heating boiler was about to be installed at a primary school when the inspector suggested that buried condensate return piping might be leaking. A hydrostatic pressure test was done and the piping was dumping possibly half of the condensate into the ground. This most likely would have caused a premature failure of the new boiler if the condensate piping had not been replaced first. The excessive make-up feed water would have resulted in higher fuel cost (heating the cold water), scale/sludge accumulation, and eventual boiler failure.

### **Condensate Tank Too Small**

An office building's steam heating system frequently flooded the boiler during the early fall, milder winter days, and late spring time operation. This condition resulted in draining of the boiler to a normal operating level to ensure a sufficient steam generating space. As steam demands increased, additional make-up water was needed. When steam demand fell, excess water within the boiler was voided and/or the condensate tank overflowed, sending water to the sewer system.

An inspector made the building owner aware of the voided condensate, excessive make-up feed water, and potential premature boiler failure. An engineering study was recommended that resulted in condensate return system modifications and eliminated the excessive loss of water.

### **Divine Intervention**

A church hot water heating boiler was about to be replaced with a similar-sized unit. During the initial planning/bidding process the inspector suggested a reevaluation of the facility and its heating system installation. It was found that insulating previously bare hot water piping, zoning specific offices, the worship area, social hall and meeting rooms, and using a modular (multiple boiler) versus a single large boiler would be more efficient. Although the cost for the entire project was more than initially projected, the subsequent heating system had lower operating expenses. Following the installation, the fuel bill was cut almost in half and all areas received sufficient heat to satisfy all of the church members.

### **Start-Up/Shut Down**

A university began shutting down the campus boilers and steam system overnight and bringing the boilers back on-line early in the morning with some severe results. Almost immediately the boiler furnace refractory began crumbling and the steam/condensate lines began leaking due to the excessive stress. The inspector aided the university's maintenance and business management team in recognizing the potential seriousness of this decision. They finally returned to their previous high fire during the daytime and low fire overnight in order to save the boilers and steam/condensate piping from an almost certain total destruction.

### **Operator Training**

Operator training should be included as part of the boiler installation. The boiler inspector may also be consulted to assist you in knowledge of the equipment and its operation. Operator training should cover items such as:

- Identification of boiler, controls, safety devices and system components;
- Proper start-up and shut down procedures;
- Periodic testing of safety devices;
- Routine visual inspection and record keeping (logs);
- In-house serviceable items and those items better left to a professional;
- Problem areas and possible corrective actions; and
- Emergency reference with names and telephone, cellular and fax numbers.

Boiler inspectors are an excellent source of boiler operation and training opportunities. They may not have all the answers, but they are another valuable resource. Be sure to ask the inspector about your equipment, how it works,

problems encountered, solutions, and potential vendors or manufacturers to consider.

Although specific answers or recommended personnel may not be available, often boiler inspectors can at least offer additional sources for further information. Listen carefully — sometimes what an inspector does **not** say could be more valuable than what is said.

### **In Conclusion — Include Your Inspector from the Start**

During a new or retrofit installation, the boiler inspector is more effective if included early in the process. After the fact, the inspector may discover that there is too little clearance, missing controls or valves, or safety devices or that they are improperly installed, insufficient combustion air, insufficient energy conservation measures resulting in higher operating costs. Any of these problems could cost an owner extra to have them “fixed” before an operating certificate is issued. Also, it is a worthwhile idea to have a contract clause for a new or retrofit boiler installation that assures all applicable codes will be met once the job is finished.

Boiler inspectors are not out to pit the building owners and installers against one another but rather achieve the best installation, the most ideal operation, and the longest useful life expectancy for the equipment. The longer and more trouble-free the boiler operates, the better it is for everyone.

### **Inspectors Can Help with Loss Prevention and Efficient Operation**

Boiler inspectors have demonstrated their technical knowledge through examinations and have acquired years of practical hands-on experience. They have construction codebooks, jurisdictional regulations and manufacturers’ reference material at their disposal.

When facing decisions concerning the boiler/heating system, remember to consult with your insurance and/or jurisdictional boiler inspector(s). The insurance boiler inspector is concerned with loss prevention and efficient operation of your equipment to help minimize the risk exposure for their employer. You benefit as well from this concern; the less risk of exposure to the insurance company, the fewer equipment problems that may be anticipated.

[These comments are offered as a general guide and are not intended to supplant information or instructions from the equipment manufacturer. For complete information on your particular equipment, consult with the manufacturer or its service representative.]

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