

These application notes are for general guidance and information only. Users will need to undertake independent analysis for specific sites.

Summary

Boilers are major users of energy and any inefficiency in their operation will result in significant waste.

Use of Online Standby Boilers

The practice of operating standby boilers, in case of problems with the boiler carrying the load, can be a significant waste of fuel. Consider instead the implications of shedding or reducing non essential load if problems do occur. Buildings usually take many hours to cool to a noticeable extent, even in cold weather, and temporary interruptions to water heating may not have a noticeable effect. A reduction in fuel use of 10% or more can be achieved when the use of standby boilers is ceased.

Selection of Boilers

A study should be undertaken in the early design stage to determine if hot water would be better utilised rather than steam. Boilers operate most efficiently at, or close to, their rated output. Select the boiler, or combination of boilers, to have ratings that will most closely match the expected demand. If the demand falls well below the rating of the smallest boiler for an extended period, consider installing an extra boiler of suitable size to meet the demand for this period. Banks of multiple boilers provide greater operating efficiencies by being more operationally flexible, better load matching and greater reliability. Consideration should always be given to design innovations that reduce energy consumption.

Condensate Return

Condensate should always be returned to the feed tank. This minimises the need for water treatment, as well as conserving the energy in the condensate. Condensate return lines should be well insulated to reduce heat loss.

Remote Steam Loads

The cost of supplying small steam loads at points remote from the boiler plant can be very high, due to energy losses from the steam and condensate piping, and maintenance. In some cases installation of separate plant at the point of use will give significant savings.

Heating Plant (Boilers)

- Inspect boilers for scale deposits. Scale reduces the efficiency of the boiler.
- Keep a log of pressure, flow and temperature
- Combustion efficiency should be checked regularly
- Regularly clean soot and flash from the fireside of the furnace and tubes
- Chimneys and flues should be checked for blockages and other improper draft conditions.
- Check and maintain burners, control valves, feed pumps and fans to ensure that they are operating efficiently
- All heat exchanger surfaces should be cleaned regularly.

- Use appropriate water treatment and blow-down procedures to reduce fouling of transfer surfaces. For example sulphite will produce less foaming and carryover than tannin but will require more frequent blow down when steam temperatures are low
- Check operating pressures of steam boilers to ensure they are not excessively high in relation to actual requirements.

Steam Systems

Improvement to steam reticulation systems can often be simple, easy and cheap. They include:

- Install and maintain in good condition, insulation on all steam and condensate piping, water heaters and condensate receivers. Ensure that underground pipes are properly protected and do not become waterlogged.
- Provide adequate pressure gauge points and flow meters for proper monitoring of the steam system.
- Eliminate leaks.
- Return condensate and recover flash steam.
- Steam systems frequently serve only part of the load for which they were originally designed. In such cases, evaluate possible boiler downsizing.
- Consider installing feed water/condensate/flash steam heat exchangers to preheat feed water.
- Eliminate exceptionally long runs of piping by using localized steam generation, particularly for intermittent loads

Steam and Condensate Piping

- Inspect insulation regularly, and repair or replace as necessary.
- Check all valves, automatic temperature control pressure reducing stations and accessory equipment. Adjust, repair or replace as necessary.
- Inspect and monitor steam traps. Their failure to operate correctly can have significant impact on the overall efficiency of the system. Regularly inspect all steam traps, valves and pressure reducing stations. Consider trap monitoring equipment.
- Inspect and repair leaks.

References

IHEA/VHA. Energy conservation guidelines. Vol 1. Design and management checklist for existing buildings. 1984.