

Steam and boilers



Steam is used as a heat transfer fluid in many industrial processes and as a source of energy for plant and equipment.

By ensuring your boiler and steam distribution systems operate at optimum efficiency you can:

- reduce energy, water and chemical consumption
- increase reliability and capacity and
- reduce greenhouse gas emissions.

Conduct an audit of your entire steam system to identify opportunities for improving steam generation, distribution, end-use and recovery.

Remember that upstream inefficiencies will affect process heating and the cost of producing steam, while downstream inefficiencies can be detrimental to your boiler and also affect process heating and the cost of producing steam.

Combustion efficiency

Combustion efficiency is a measure of how effectively the chemical energy of a fuel is transferred into usable heat.

Efficient combustion requires excess air to completely burn fuel inputs. Insufficient excess air results in unburned fuel while too much results

in heat loss through increased flue gas flow.

To ensure combustion efficiency, monitor stack temperature and oxygen levels and periodically tune boilers to adjust air-to-fuel ratios.

You should measure stack temperature and flue gas composition under normal operating conditions after servicing and cleaning.

Well-designed natural gas-fired systems should be able to attain a 10 percent excess air level.



up to \$3500 a year in lost steam production. The cost of a detector will be repaid in the savings made from fixing just one leak.

Stream traps

Steam traps are used to remove condensate, air and other non-condensable gases from the steam system, without removing steam.

Inspect, test and repair steam traps regularly to save energy and improve operating efficiency. A maintenance program can improve operating efficiency by 10 to 15 percent.

Insulation

Insulating pipes and process vessels can reduce heat loss from surfaces by 90 percent.

One metre of uninsulated pipe carrying steam at 700kPa will lose heat at a rate equivalent to 1000 litres of fuel or 650cu.m of natural gas per year.

Insulate steam and condensate return piping, boiler surfaces and fittings over 48.9 deg. Replace or repair deteriorated or wet insulation.

Removable insulating jackets are available for valves, flanges, steam traps and other fittings.

Consult a specialist to advise you on insulating materials and thickness. Needs vary according on moisture, temperature, physical stress and other environmental factors.

Blowdown

Blowdown is the intentional release of water from a steam system, to remove suspended and dissolved solids and prevent scale build-up. Blowdown rates typically range from four to eight percent depending on purity of feed-water.

Consult your boiler feed-water additives vendor to optimise your boiler blowdown, or consider investing in a continuous blowdown control system.

Blowdown water has significant heat content which can be easily recovered with a heat exchanger, or in a flash tank, and used to preheat incoming feed-water.

Clean heat transfer

Adopt a good deposit control program to maintain clean heat transfer surfaces.

Scale acts as an insulator between the flue gas and convection surface, reducing the efficiency of the boiler. A coating of scale one millimetre thick can result in a five percent increase in fuel consumption.

Remove scale mechanically or by using an acid cleaner. Scale build-up can be prevented by optimising boiler blowdown practices; pre-treating feed-

water with softeners, reverse osmosis, and/or demineralisers; and treating returned condensate if needed.

Condensate return

Condensate should be returned to the feed tank, as it contains valuable heat energy and is free of impurities.

Condensate return can save 15 to 18 percent of the fuel used to heat cool make-up water. It also reduces water and energy consumption.

If your steam system does not include a condensate return system, consider installing one.

Insulate condensate lines and repair condensate return piping leaks promptly. If condensate is contaminated, use a heat exchanger to preheat make-up water.

Steam leaks

Identify, tag and repair steam leaks to reduce energy loss. Steam leaks are often found at valve stems, pressure regulators, connection flanges and pipe joints.

If leaks are ignored, they can cause a drop in the pressure of your system, resulting in heat loss and lower operating efficiency.

Ultrasonic leak detectors cost about \$1300 while an average leak costs

For more information

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