process HEATING

Reaching a High ROI

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Adding a condensate return system to the boiler can achieve a significant return on investment for processors.

When steam is blowing into the atmosphere, it results in a loss of steam and condensate.

One of the most obtainable returns on investment in steam systems comes from returning condensate to the boiler plant. As companies look at controlling all expenses, including fuel costs, one often overlooked area of potential savings is recovering condensate in steam operations. Reaching for these goals can reap many benefits:

- **Reduced Chemical Costs.** If condensate is returned, the need for makeup water is reduced. Lowering the quantities of required makeup water results in lower requirements for boiler chemicals.
- **Reduced Makeup Water Costs.** Water costs are rising everywhere, and a high percentage of condensate return will reduce the total makeup water costs.
- **Reduced Sewer System Disposal Costs.** Sewer system costs are directly related to the intake of water. If condensate is not being returned, the condensate is being drained to the sewer, adding to the cost for processing the sewer waste.
- **Environmental Regulations Can Be Met.** Environmental regulations may require drain water to be treated. Condensate returned to the boiler process reduces the water sent to the drain and the amount of water that falls under the regulatory control.

Steam leaks like this one result in a loss of condensate and energy.

Steam is composed of two types of energy -- latent and sensible energy. When steam is supplied to a process application (heat exchanger, coil, tracer, etc.), the steam vapor releases the latent energy to the process fluid and condenses to a liquid, better knows as condensate. The condensate contains the sensible energy from the steam vapor. The condensate can contain as much as 16 percent of the total energy in the steam vapor, depending on the steam pressures.

Unfortunately, a large percentage of plants waste the condensate from the steam system rather than returning it to the boiler plant. And, in some plants that do return the condensate to the plant, uninsulated tanks, condensate pipes, valves and fittings diminish the return on investment because some thermal energy is lost through the uncovered components. To maximize the return on investment for a condensate system, all devices should be insulated to prevent thermal energy losses.

Steam system components must be insulated to ensure the thermal energy in the condensate is not lost. This condensate tank is fully insulated to help prevent thermal energy losses.

Avoid the Common Pitfalls

Among the reasons that companies do not already return condensate to the boiler plant include pumping and trap issues, corrosion and leaks. Here are some of the reasons cited by companies to explain why they do not return the condensate. By being aware of the common pitfalls, you can avoid falling into these traps and letting heat and money go right down the drain with the condensate.

Improper Pump Sizing. Companies should select correct condensate pumps with the proper net positive suction head (NPSH). A number of condensate pumps on the market can only permit condensate temperatures of less than 200°F (93°C). Condensate temperatures will be close to atmospheric saturation temperature of 212°F (100°C). Therefore, the condensate pumps must have the proper NPSH. Failure to design with the proper NPSH will result in pump cavitation as well as damage to the seals and impeller in a short period of time.

Steam Trap Issues. Steam trap undersizing and improper installation cause them to malfunction. Too often, the quick solution is to drain the condensate to the sewer. Many steam trap installations have the

drain valves open to remove the condensate from the process, therefore achieving proper temperatures.

Condensate Line Corrosion. The condensate system will produce carbonic acid as a result of excessive carbon dioxide in the system. The highest concentration of carbonic acid will be in the condensate return lines because carbon dioxide dissolves in cooling condensate. Most condensate lines are installed with schedule 80 steel pipe and threaded connections. The steel will deteriorate from the condensate corrosion, but the effects will show first on the pipe threads, which typically are more susceptible to deterioration due to corrosion. To slow the corrosion effects on the system, plants should use stainless for condensate pipe and valves and avoid the use of threaded connections.

This condensate return tank was designed to meet current industrial standards.

Condensate System Installation. Steam system components should be insulated to ensure that the thermal energy in the condensate is not lost. Everything in the condensate system above 120°F (49°C) should be insulated. Insulation also will help protect personnel from hot condensate system components, thus improving plant safety.

Leaks. Plants often have leaks from malfunctioning components in the steam and condensate system that can contribute to loss of condensate.

Flash Steam Losses. Flash steam is lost from condensate tank vents that are venting to the atmosphere.

In conclusion, condensate is one of the top five items that must be targeted in a steam and condensate system in order to reduce energy costs and improve reliability. In today's cost-conscious operating environment, it is important to exploit every means of reducing costs and improving efficiency. A condensate return system can help reduce energy costs and improve reliability.

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