Steam Auxiliary Boiler Equipment Can Help Reduce the Possibility of Boiler Flooding, Thermal Shock

Used in tandem, boiler feed and condensate return units can help ensure safe, reliable and efficient boiler operation.

In processes that require steam, the boiler is the heart of the operation, and if it fails, production can come to a grinding halt. So, if your industrial process uses steam, it is critical that the boiler and any of its auxiliary parts are in good working order, allowing the system to run most safely, effectively and efficiently.

Not long ago, an industrial boiler could be as large as the room you are sitting in. As boiler manufacturers have pushed to increase the efficiency of their equipment, the units have become smaller and smaller, which can cause a new set of problems, including the possibility of boiler flooding or thermal shock.

Boiler Flooding

Boiler flooding can stop an operation that requires steam in its tracks. It occurs when too much water enters the vessel. Take an older cast-iron boiler with an 80-gallon capacity, for example. Today's boiler with the same heating capacity may only have 14 to 16 gallons of water when filled to the proper level. Both boilers will lose water at the rate of about 0.5 gallons per minute. What is important for the boiler's operation is how much water is represented between the "normal" and "low" water cutoff lines. There must be enough water in those couple of inches inside the boiler to make up for the lag time between the beginning of the steam generation and the return of condensate back to the boiler. With the old big boiler, this wasn't a problem. Those couple of inches represented several gallons. But if there are only 16 gallons of water in the new boiler, those couple of inches could represent only 3 to 4 gallons. At a steaming rate of 0.5 gallons per minute, those 4 gallons will be gone in 8 minutes or less—and depending on the size of the heating system, it could take at least twice that time for the condensate to find its way back to the boiler. The boiler will shut down on low water or add more water through an automatic water feeder. Either way, you have a problem. If the boiler shuts down, you won't

get the heating capacity that the boiler is rated to deliver. If you add too much water, the boiler will flood when the condensate finally arrives back at the boiler.

The boiler condensate feed pump is sized to overcome the steaming rate, and a level switch on the boiler will turn the pump on and off as the level fluctuates when the burner fires. This is where a boiler feed unit, which consists of a pump and tank, becomes a crucial piece of auxiliary equipment on a boiler. The tank will hold the water that is needed in reserve to prevent the boiler from going into low-water status. The mechanical float in the feed unit tank can be used to provide additional water for the system when necessary.

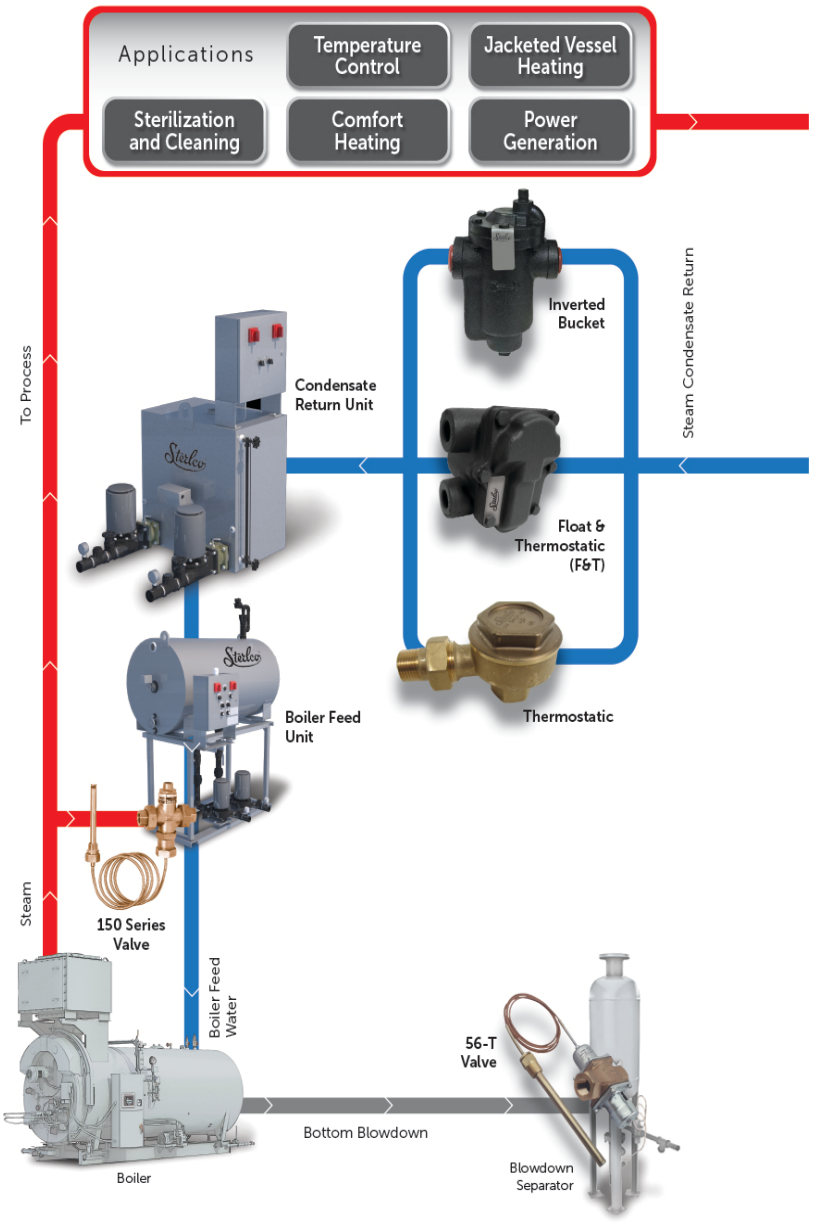
Depending on the application, there are cast iron, stainless steel and steel boiler feed units available. Sterling will work with you to help you determine the sizing for your boiler feed unit based on boiler horsepower, GPM flow rate, the number of pounds per hour of steam, etc. A sampling of Sterling's Sterlco® boiler feed units can be found on the next page.

Thermal Shock

One of the worst-case scenarios for an industrial steam boiler is thermal shock, which occurs when cool water enters a hot boiler. Not only can thermal shock cause costly repairs or even the need for a full boiler replacement and halt production, it is a serious safety issue that has been known to cause explosions and even fatalities.

Introducing cool water into a piping hot, metal pressure vessel is never a good idea, but some operators either do not know the consequences of this action or do not take it seriously enough. If you know about the issues that low-temperature feedwater can cause in a boiler system, you can take the steps necessary to avoid this at your facility.

Boiler thermal shock is a sudden thermal



change that occurs within the boiler, causing rapid and uneven expansion and contraction of a boiler's structure. Several conditions can contribute to boiler stress and eventual cracking. All involve introducing excessively low temperature water or cool water at high flow rates into a hot boiler. Failures are typically of the iron or metal fatigue type and are caused by thermally induced stress cycling of the boiler structure.

For any boiler system to operate at its optimal performance, y- strainers or basket strainers should be added to filter out any impurities that may lead to significant problems in the system. Sterlco® boiler feed and condensate return systems from Sterling can help maintain peak efficiency and prolong the life of boilers.

The boiler feed is equipped with one or more feed pumps and a corrosion-resistant receiver tank. The system automatically adds makeup water to replace system losses.

Additionally, condensate return units improve energy efficiency, reduce chemical costs, reduce make-up water costs, reduce sewer system disposal costs and help meet environmental regulations.

Sterling offers a range of standard and optional features in units made of cast iron, stainless steel and steel variations.

Based on history, longevity and reliability, engineers often specify cast iron. Stainless steel units are a substitute for cast iron as they still have longevity and reliability but are lighter in weight than cast iron, which makes them easier to install. Less expensive steel models are also available, and Sterling's models will hold up because they use thick 3/16" steel.

The following sampling are just a few of the units available from Sterling. Contact a representative to spec the correct type and size of auxiliary equipment for your boiler.

BOILER FEED UNITS

Sterlco® Boiler Feed Pumps set new standards of performance. Designed to be reliable and efficient at maintaining proper water levels, each unit features heavy-duty receivers for long operating life. Sterlco® Boiler Feed Units are available with extensive capacity configurations and optional features for commercial and industrial HVAC, food, beverage, pharmaceuticals, hospitals, schools, power utilities, refineries and petrochemical applications. Their 3450 rpm motors ensure maximum efficiency while maintaining minimum motor horsepower. Available in a range of sizes, these U.S. made pumps have just the right accessories and options to meet your unique needs. A nationwide network of stocking distributors means fast, easy, year-round access to pumps and replacement parts.

Standard features

- Simplex or duplex construction
- Bronze fitted centrifugal pumps
- Energy efficient 3450 rpm motors
- Automatic venting
- "Sterl-Seal" ceramic pump seal (250°F)
- Heavy-duty make-up water valve
- Gauge glass
- Wide range of options and accessories

Optional Features

- Mechanical and electric alternator for duplex units
- Gauge glass

- Thermometer
- Isolation valves
- Special motor construction, such as totally enclosed, washdown duty and explosion-proof is available
- 120 gallon and elevated tanks are available
- Complete NEMA 12 Control Panel

CONDENSATE UNITS

Sterlco® Condensate Units offer a thicker tank wall design and wear-resistant pump seals keep the system running longer and require less maintenance. The 3450 rpm motors ensure maximum efficiency, maintain a minimum motor horsepower, and are economical to operate. Available in a wide range of sizes, these U.S. made units have just the right accessories and options to meet your unique needs. Sterlco® Condensate Units are available in steel, cast iron and stainless-steel receivers with extensive capacity configurations and optional features for commercial and industrial HVAC, food, beverage, pharmaceuticals, hospitals, schools, power utilities, refineries and petrochemical applications.

Standard features

- Heavy-duty receivers
- Simplex or duplex construction
- Bronze fitted centrifugal pumps
- Energy efficient 3450 rpm motors
- Automatic venting
- “Sterl-Seal” ceramic pump seal (250°F)
- Heavy-duty float switch
- Wide range of options and accessories

Optional features

- Mechanical and electric alternator for duplex units
- Gauge glass
- Thermometer
- Isolation valves
- Special motor construction, such as totally enclosed, washdown duty and explosion-proof is available
- 120 gallon and elevated tanks are available
- Complete NEMA 12 Control Panel

STERLING'S MESSAGE

Sterling's future is built on a strong past, dating back to 1916, when Sterling Engineering Company began manufacturing valves, traps and condensate pumps for steam and hot water systems. New generations of these products are still offered today as part of the Sterling Steam Control family. Sterling's sales team is staffed by trained representatives with extensive knowledge in process applications. Covering wide-ranging industries from plastics to machining to food and pharmaceutical, Sterling's experts can help find the right solution for your process needs. As an ACS Group brand, Sterling is supported with access to a broad range of parts to ensure your equipment is kept running in top condition.

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