Effective Boiler Maintenance Begins with Effective Feedwater Treatment

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An effective boiler feedwater treatment program is not only easy to implement, but is also fundamentally important to proper boiler operation, whether the boiler is a conventional firetube or a coil tube type.

Benefits

An effective water treatment program has many benefits. First, it results in efficient operation. Improperly treated water can result in scale build-up that greatly reduces fuel efficiency. Second, proper water treatment reduces the risk of unscheduled down times due to problems resulting from improper water treatment. This results in a more reliable operation.

An effective water treatment program also lowers maintenance costs. Improperly treated water can lead to failures from scale build-up or oxygen corrosion, either of which can mean costly repairs or coil replacement. Finally, a treatment program leads to consistent product quality. Inconsistent water quality can result in inconsistent steam quality. This in turn can affect the quality of the feed.

Elements of an effective feedwater treatment program include treatment, testing and control limits, frequency of testing and record keeping.

Treatment

In most animal feed boiler applications, treatment comprises four steps:

Softening involves treating the boiler water with a resin based (Zeolite) water softener. Water softening is essential to prevent the accumulation of scale on the tubes, which in turn impedes heat transfer and increases fuel consumption. For example, only 1/16-inch of scale build-up increases fuel consumption by 10 percent to 15percent. For a boiler operating at 300 BHP, 16 hours per day, 300 days per year, with a gas cost of $4.00 per MMBTU, this translates to an annual increase in fuel cost of between about $24,000 and $36,000!

In extreme cases, the continued use of un-softened water can lead to scale build-up sufficient to necessitate blocking or replacing a coil. Either fix is time-consuming and costly.

Deaeration removes excess oxygen in the feedwater, which causes corrosion and can necessitate tube replacement. Deaeration is typically accomplished by mechanical agitation aided by chemical treatment. (Sulfites are added to react with oxygen that remains after mechanical deaeration.) Preheating the water with steam in the feedwater receiver in an atmospheric or pressurized deaerator assists in stripping oxygen from the feedwater and reduces the amount of sulfites needed.

Addition of chemicals to help eliminate oxygen, control alkalinity (pH), and control sludge. In addition to the sulfites discussed above, other chemicals may be required, depending upon the make-up water analysis and the requirements of the boiler. In cases where condensate is returned to the boiler, a condensate treatment chemical is usually added to neutralize the acidic condensate that would otherwise tend to corrode steam and water piping.

Boiler blow-down controls the level of Total Dissolved Solids (TDS) in the feedwater. Make-up water always contains Total Dissolved Solids (TDS) that are introduced into the boiler water system. Over time, the level of TDS that is in the boiler water system elevates. For every boiler there is a limit to the level of these solids. Exceeding that limit can cause problems with boiler performance, including carry over (excessive water in the steam) or the formation of sludge at the bottom of a firetube boiler.

TDS levels are controlled by "blowing down" (removing) some of the concentrated water and diluting it with additional make-up water. In most cases, this can be done with automatic devices.