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Proper Boiler Lay-up Can Provide Big Savings

Owners and operators of steam boiler systems need to be aware that improper lay-up and storage of their boiler for even a relatively short period of time can result in severe damage to the boiler and cost their operation thousands of dollars in repair and maintenance costs and decreased system efficiency.

Under normal operating conditions, suspended matter is maintained in a fluid, dispersed state in the boiler water. Prior to shutdown of the boiler, these solids need to be removed to prevent their deposition on heat transfer surfaces.

Shutdown

When a shutdown is planned, boiler operators should follow these procedures:

1. Three to five days before a scheduled shutdown, increase the blowdown rate by at least 50%. This increase should be in both surface and bottom blowdowns.
2. During this time, increase the sludge conditioner residual by 50 to 100%. Maintain all other chemicals at normal residuals.
3. During the last 24 hours before shutdown, increase bottom blowdown frequency, using short (5 to 10 second) blows every 1 to 2 hours, if possible.
4. When the load is dropped from the boiler, cooling should be accomplished at the rate specified by the boiler manufacturer.
   a. Blow down the water column, gauge glass and feedwater regulator while there is still pressure in the boiler.
   b. Continue frequent bottom blowdowns and refill boiler with deaerated feedwater. Maintain chemical residuals.
   c. Continue to blow down and refill until the furnace is cool enough to enter. At this point, the boiler is cool enough to drain. If the boiler is drained too soon, it will contain enough heat to bake on remaining sludge.
5. Open the boiler as soon as it is drained and immediately wash out any remaining sludge with a high-pressure hose.

Lay-up

Wet Storage

Wet lay-up is used when the boiler will be out of service for shorter periods of time. The boiler can be brought back into service from wet lay-up quickly. To place the boiler in wet lay-up:

1. Fill the boiler to its normal operating level, preferably with deaerated feedwater.
2. Fire the boiler to the point of making steam with the unit vented to the atmosphere to drive off dissolved oxygen.
3. Add catalyzed sodium sulfite to achieve a residual of at least 100 ppm as SO_3. Add sodium hydroxide (caustic soda) to establish a hydrate (OH^-) alkalinity residual of 200 ppm.
4. Before the boiler has cooled to the point of drawing a vacuum, completely fill it with deaerated feedwater.
5. The boiler should be fired weekly to create circulation and should be tested for SO_3 and OH^- residuals. Add chemicals as necessary to maintain the desired levels.
6. For start-up, drain the boiler to normal operating level. Resume normal feed of boiler treatment chemicals as soon as the boiler is placed back into service.

Dry Storage

Dry lay-up is generally employed when the boiler is going to be out of service for longer time periods. Boilers that are out of service for *any* length of time are very susceptible to corrosion on waterside surfaces. The following dry storage procedures are designed to allow boilers to be stored for any period of time without damage:

1. The boiler should be dried as thoroughly as possible using fans or other means.
2. Place a chemical desiccant in each drum so that air circulation beneath the desiccant container is possible. Use quicklime (CaO) at 8-10 lb/1000 lb/hr rated capacity or silica gel at 10-12 lb/1000 gallons of water holding capacity.
3. As soon as the desiccant is in place, close all boiler openings and tightly blank all connections.
4. Inspection of the desiccant should be made every 2 to 3 months.
5. Remove the desiccant prior to placing the boiler back online.

New volatile corrosion inhibitors (VCIs) have been developed that offer an alternative to desiccants for dry storage. VCIs form a protective film over all boiler waterside surfaces. Follow the dry storage procedures above when using a VCI. The VCI manufacturer provides directions for usage rates. It is not necessary to remove the VCI when the boiler is refilled for startup.

By using the correct procedures for boiler shutdown and either wet or dry lay-up, boiler system owners/operators will help keep their systems running at peak efficiency and save themselves and their staffs time and money.

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