CHEMTEX
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Technical Topics

Boiler Blowdown

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When a boiler is generating steam, the feedwater continuously carries dissolved mineral impurities into the boiler. These dissolved impurities stay behind in the boiler water when steam is made; only pure water leaves the boiler as a gas. These dissolved impurities concentrate in the boiler water until the water can no longer hold all the impurities in solution. Once these impurities have reached a saturation level they will begin to drop out forming a sludge or scale. If this sludge is not properly removed from the boiler deposits will begin to form on the boiler water-side surfaces. To prevent an excessive accumulation of dissolved and undissolved solids which will interfere with proper boiler operation, a blowdown program must be established.

The amount of blowdown or number of times the boiler is blown down each day depends upon the concentration of impurities in the boiler water. Boilers operating with soft water or high quality feedwater will require less blowdown than boilers operating on hard water. The higher the level of impurities in the feedwater, the higher the sludge potential. Boilers operating on soft water will require more top or skimmer blowdown to remove dissolved solids whereas boilers operating on hard water will require more bottom blowdown to remove the settled solids. Frequency of blowdown will vary greatly based on water quality and percentage of condensate return. Recommendations of a qualified water treatment professional should be followed regarding blowdown procedures.

Bottom blowoff valves are primarily meant to be used as drain valves; however, it is frequently necessary to use the blowoff valves to get rid of mud and sludge that have settled to the bottom of the boiler. Generally, when boilers are being operated at or near rated capacity, the circulation is great enough that mud and sludge do not have much chance to settle out. The boiler should be blown down at lower firing rates. If the boiler is to be shut down for a short period of time or taken off line, it must be blown down to remove the suspended material. If this is not done, the suspended material will settle out on the boiler surfaces and be baked on during the next firing. Blow down at this time is critical to keeping boiler surfaces clean.

When necessary to blow down the boiler through the blowoff valves, they should be opened slowly and carefully. The boiler should be equipped with either two slow-opening valves or one quick-opening valve and one slow-opening valve. If the boiler has more than one bottom blowdown connection, a second quick-opening valve is needed. The following steps should be taken to blow down a boiler.

1. Open the quick-opening valves (ones closest to the boiler).
2. Open the slow-opening valve.
3. Blow down the boiler for the amount of time specified by your water treatment consultant by opening and closing the slow-opening valve. Pay close attention to the water level in the gauge glass. Some boilers require several short blowdown cycles to maintain the proper water level in the boiler.
4. Close the slow-opening valve.
5. Close the quick-opening valve(s).

6. Open the slow-opening valve again to drain the line between the quick and slow-opening valves.
7. Close the slow-opening valve again and double check that the shutoff is tight after the valve has cooled.

   CAUTION: Never pump the quick-opening valve to blow the boiler. Such action could cause water hammer and damage the piping and valves. It could also cause personal injury. Never leave an open blowdown valve unattended. Remember the valve(s) closest to the boiler must be opened first.

Continuous blowdown or surface blowdown from a location designated by the boiler manufacturer is generally preferable to intermittent bottom blowdown for control of dissolved solids. Automatic blowdown controllers are available for boilers that have a top or skimmer blowdown port. Automatic blowdown controllers provide superior solids control along with outstanding energy savings. Further savings may be found through the installation of a blowdown heat recovery unit.

Proper boiler blowdown is critical to a successful water treatment program. Chemical treatment is only one aspect of a successful program. Proper start-up and take-down procedures must be followed along with proper off-line storage to have a successful program.