



## Maintenance Plan Increases Boiler Reliability and Ensures Safety

Unexpected boiler equipment failure can be dangerous and typically results in lost productivity and revenue. Many times, a boiler failure is caused by overheating due to scale deposits on waterside surfaces or corrosion. Sometimes a failure can result in a waterside or fireside explosion that has more serious consequences, including injuries and facility damage. All of these issues can be avoided or greatly mitigated by properly implementing a preventative maintenance plan.

Below is a guideline of boiler system tasks that should be performed regularly. It is important to follow the manufacturer's recommendations and governmental regulations regarding maintenance and inspections. Also, be sure to keep boiler logbooks for daily operation and maintenance activities.

- Boiler failures are many times caused by overheating due to scale deposits on waterside surfaces or corrosion
- Keep boiler logbooks for daily operation and maintenance activities
- For semi-annual and annual maintenance tasks, hire a trained boiler technician

### Daily Maintenance

- Blow down the bottom of the boiler.
- Blow down the water column(s) and open the drain slowly to prevent float damage.
- Track boiler pressure and temperature, especially at the steady state to determine if it's keeping up with the load.
- Take a stack temperature reading to determine how efficiently the boiler is operating. A well-tuned boiler should have a stack temperature ranging between 50 – 100 degrees above the steam or water temperature depending on firing rate.
- Routinely check the gas pressure coming into the gas pressure regulator and also its downstream pressure.
- For a hydronic (water) boiler, monitor the supply and return temperatures, which are essential control variables that dictate load satisfaction based on the engineer's design.
- Look through the boiler's sight port in the furnace and observe the flame for any evidence of impingement and possible sooting.
- Observe the water softener, dealkalizer, chemical feed system and any other equipment that supports the boiler to ensure proper operation and required levels of salt and chemicals.
- Take water samples on a regular basis and compare them to the recommendation.

### Weekly Maintenance

- Conduct an evaporation test on the low water level control(s) to ensure proper operation and burner shutoff at the low water point.
- Check the condition of the gauge glass on the low water cutoff for wear and etching.
- Check the operation of the fuel supply valves.
- Check the single point positioning system on the burner; if applicable, look for wear, slip and hysteresis of the linkage arms, connecting rods, cams and springs.
- Observe the operating and modulating controls, and while watching the pressure gauge, see if they are turning on and off at their respective set points.
- Pull out the flame scanner to ensure the burner shuts off at the prescribed time.
- Check the indicating or running lights and alarms to make sure they are functioning properly.
- Assess the motors for noise and vibration.

- Look for leaks of fuel, water or flue gas.
- Check the high- and low-gas-pressure switches and the combustion air proving switch.

#### **Monthly Maintenance**

- Check the burner's diffuser for any deformation, burning or cracking.
- Check the burner's pilot tube that contains the electrode that provides the spark for pilot ignition.
- Check the free movement of the air damper device or devices.
- Check the entire outside of the boiler for signs of hot spots.

#### **Semi-Annual Maintenance**

- Remove and inspect the low water cutoff bowl and its interconnecting piping.
- Pay close attention to the condition of the head assembly's wiring and switches.
- Check the pump alignment on all the base-mounted pumps in the boiler room, and reset combustion using a combustion analyzer for reading O<sub>2</sub>, CO and NO<sub>x</sub> emissions.

#### **Annual Maintenance**

- Properly shut down the boiler and open the access doors to expose the fireside of the boiler.
- Thoroughly clean the tubes and tube sheets.
- Inspect the insulating materials, looking for any degradation.
- Check the refractory. Cracks in the refractory insulation of 1/8" or less are okay.
- On the waterside, look for heavy scaling and bridging of the tubes with scale.
- Look for evidence of oxygen corrosion.
- Check the gas valves and conduct the safety test recommended by the valve manufacturer.
- Check the safety valve to make sure there is no sign of leakage.
- On the control panel, ensure that all of the electrical connections are tight.
- Inspect accessories such as the vented feedwater receiver, deaerator and chemical feed systems, if these are part of the boiler system.

Daily inspections can be performed by qualified plant personnel, but for semi-annual and annual maintenance tasks, it is best to hire a trained boiler technician.

To learn more, watch the webinar titled [Routine Boiler Maintenance Ensures Reliability, Efficiency and Safety](#). To locate a Cleaver-Brooks representative or find a trained boiler technician near you, visit [cleaverbrooks.com](http://cleaverbrooks.com).