

 **Johnston Boiler Company Technical Brief****POLICY STATEMENT CONCERNING HOT WATER BOILERS**

Johnston Boiler Company has an excellent record of long life and maintenance free operation of hot water boiler applications.

To avoid inadvertent equipment damage by firing without being filled with water, each hot water boiler is equipped with a low water cutoff.

To help avoid “thermal shock” on startup, each Johnston Hot Water Generator is provided with a low fire hold aquastat as standard equipment. This control overrides the burner fire control circuit to restrict the burner to low fire until the boiler water is up to its set-point (set at approximately 150°F).

In an effort to avoid the problems of field repair and downtime and to maintain good customer relations through the life of the project, we feel that the following should be observed. It may affect system engineering, equipment pricing, quotation and sale, as well as operation and maintenance of all hot water generators.

***SYSTEM DESIGN***

1. Avoid applications of Scotch Marine Boilers where system temperature differential exceeds 50°F (Example – for a supply temperature of 220°F, return water temperature should not enter the boiler lower than 170°F).
2. Boilers over 900 HP (30,000 MBH) must include a pricing allowance for seal welding tube ends. (Refer to factory for pricing).
3. For operating pressures above 160 psi and/or temperatures above 250°F, the boiler must be designed and fabricated to the appropriate high pressure under ASME Code Section I in lieu of Section IV.
4. Avoid applications where boiler water temperature is varied or reset. Constant temperature operating conditions are most desirable. Low hot water discharge temperatures will also be accompanied with low exhaust gas temperatures which can be below dew point with the possibility of last pass, flue box, and stack corrosion.
5. Avoid start-stop zone control system that might allow an unused or dormant zone of cold water to be discharged abruptly into the return piping and to the boiler.

6. Control response change of temperature should not exceed 5°F per minute.
7. The standard nozzle arrangement provides a hot water supply nozzle and the hot water return nozzle on the top centerline of the boiler. The supply nozzle is provided with a dip tube for air elimination through an auxiliary tapping provided. The return nozzle is provided with an internal diffusing baffle that mixes the return and boiler water as it directs flow to the lower areas of the boiler. External pumped blending may be used at the engineer's discretion but is not necessary.
8. Provide adequate supply and return water thermometers (and recorders if possible) so that system conditions can be verified.

### ***OPERATION***

1. Start up of the boiler in the hot water system should follow start up of the recirculating pump so that all parts of the boiler and the heating system are heated and brought up to temperature together.
2. Do not start the boiler without checking limit settings and the low water cutoff operation.
3. Do not start boiler without checking low fire hold setting – approximately 150°F.
4. If necessary to isolate a zone of an operating system for maintenance or repair, great care must be taken in restarting the system circulation so that an abrupt release of cold water to the boiler is avoided and change of temperature does not exceed 5°F per minute. Temperature control for this portion of the system, during the restart period, should be expected to be beyond the function of the automatic control system and should be carried on manually.
5. In multiple boiler installations, the addition of a cold boiler to a hot system should be done with the same care in opening isolating valves as described above in restarting circulation.
6. Burner operation on the boiler should be arranged with the modulating set point between the “cut-in” and “cut-out” temperature so that the heat input is started low, brought up to the required firing rate, and turned back to low before being cut off. This provides time for temperature and stress equalization in the boiler parts.

### ***MAINTENANCE***

1. Water treatment should be carried on locally under the direction of a reputable water treatment company. Before continuous use, the boiler and system should be put through a “boil out” procedure to remove surface coatings and impurities that

may be present from manufacture and installation. A chemical inhibitor may also be needed periodically to prevent oxygen pitting.

2. Blowdown of a hot water boiler is seldom required unless called for by chemical treatment supplier.
3. Inspect and clean the interior of boiler at regular intervals and as directed by local regulations and the boiler inspector.
4. Lay up of hot water boilers can be done by leaving them full for short intervals, if the water condition is under control, or by leaving them dry with hand holes and manholes open for interior ventilation, if a long period of shut down is expected.
5. Refer to the Operator Instruction Manual and the specific manufacturer's guidelines for burner and control maintenance.