

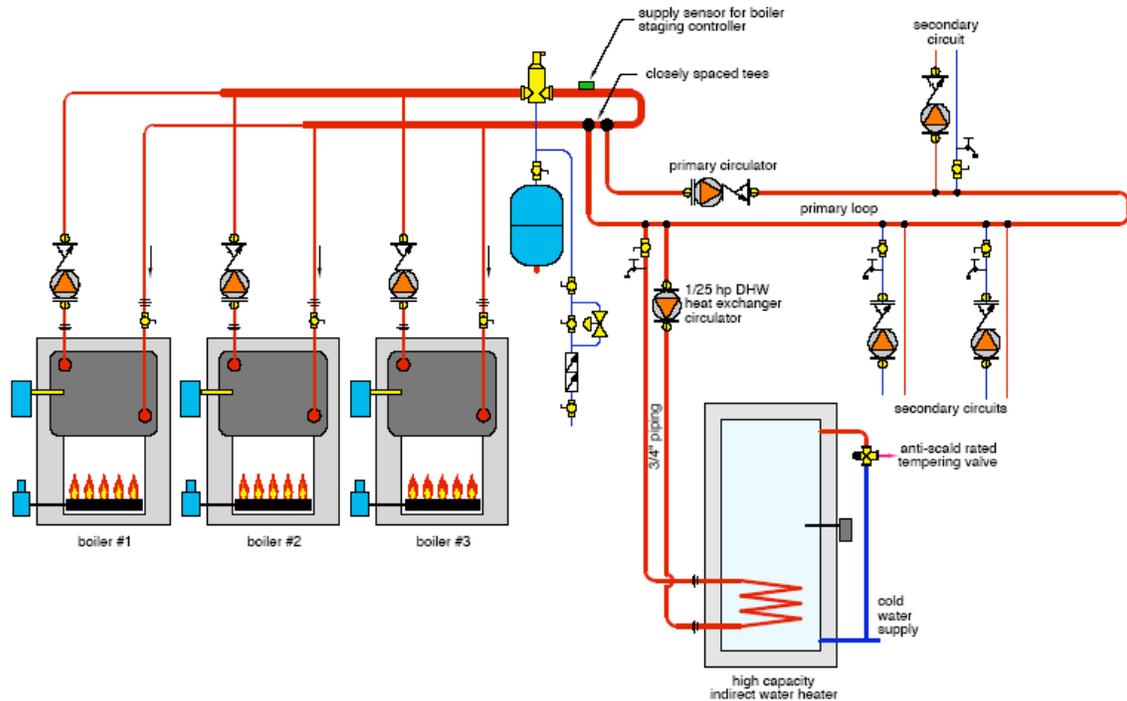
The Glitch & The Fix: November 2006

Plenty Of Capacity?

The Glitch:

A client has asked for abundant DHW, as well as space heating loads. The following system has been planned with three 200,000 Btu/hr. boilers with plenty of capacity supplying a primary loop that serves several secondary loops. Closely spaced tees have been used to separate the pressure dynamics of the various secondary circuits.

Exercise: There are at least 10 design errors present in this schematic. Can you spot at least five of them?



The Fix:

1. Heat Exchanger of indirect DHW tank should be "super-sized" to deliver full output of boilers to potable water.
2. Piping leading to DHW tank is sized to handle flow necessary to convey full output of all boilers to tank heat exchanger. A 3/4-inch tube will not convey

several hundred thousand Btu/hr. with a nominal 20 degree F temperature drop across the tank heat exchanger.

3. Circulator leading to DHW tank is sized to handle flow necessary to convey full output of all boilers to tank heat exchanger. A 1/25 horsepower circulator will not produce the flow necessary to convey 600,000 Btu/hr. at normal operating conditions.

4. Heat exchanger in DHW tank is pipe for counter-flow (in at top/out at bottom).

5. If DHW tank is piped as a secondary circuit it should be the first secondary circuit on the primary loop so it receives the hottest water. Better yet, pipe the DHW tank as a parallel circuit to the primary loop (*as shown on the fix schematic*) and eliminate the need for the primary circulator to operate during the DHW mode.

6. All secondary circulators should pump into their respective secondary circuits to boost pressure in secondary while operating.

7. Sensor for boiler staging controller must be located downstream of closely spaced tees separating boilers from distribution system. This prevents situation of no flow past sensor when all boiler circulators are off. It also accounts for any mixing taking place at the closely spaced tees that could lower supply temperature to distribution system.

8. Better to place circulators with internal checks on vertical inlet of boilers allowing water to flood volute to dislodge air at start-up.

9. Unions to remove boiler must be between isolation valve and boiler.

10. Lack of a check valve in DHW circuit allows off-cycle heat migration to drain heat from tank.

