

May 2013 The Glitch & The Fix

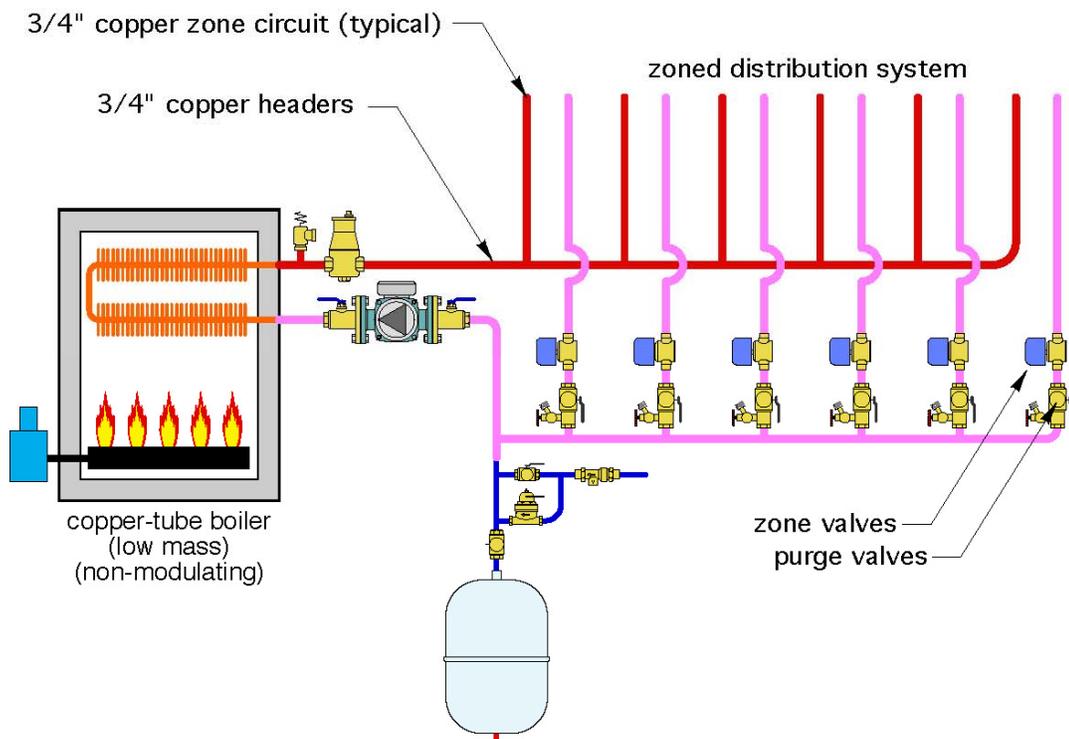
© Copyright 2013, J. Siegenthaler
First serial rights granted to BNP Media, all other rights reserved

Contractor pack

The Glitch

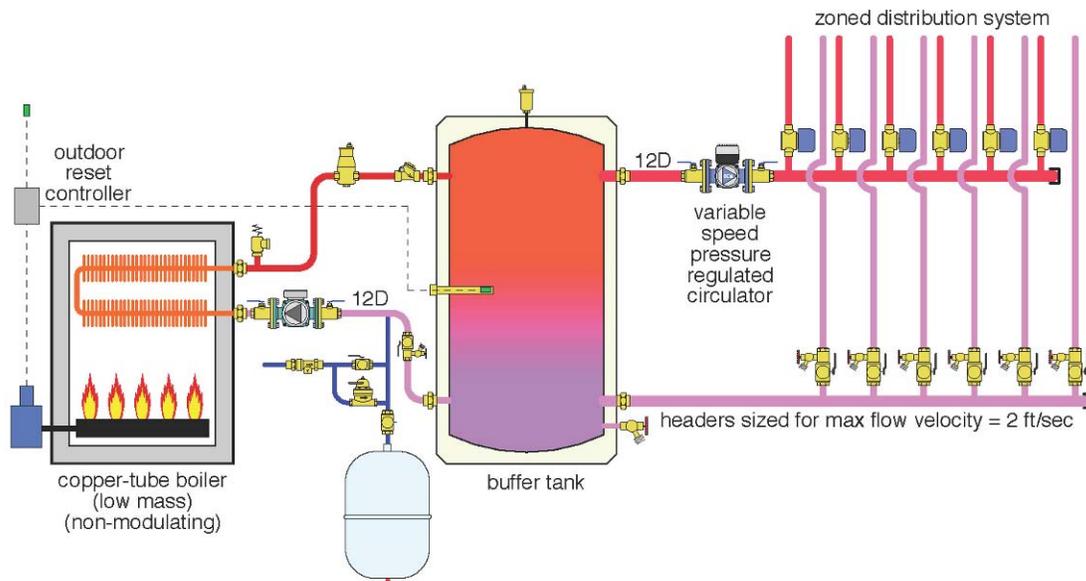
A low-mass copper tube boiler is installed as shown with six zone circuits controlled by zone valves. The installer got a great price on a “contractor pack” of 3/4-in. copper tees, so the supply and return headers are built with 3/4-in. copper, as are all the zone circuits.

There are several errors in this design. Can you spot them?



The Fix

Copper-tube boilers are “flow sensitive.” They should not be operated with low flow rates, such as might occur when only one zone circuit is operating. The correction is to install an appropriately sized buffer tank. That tank should allow the boiler to operate for an “on-cycle” of at least 10 minutes when the smallest load is calling for heat. The buffer tank also provides hydraulic separation between the boiler circulator and the distribution circulator.



Other corrections include:

1. Moving the zone valves to the supply side of the zone circuits to prevent heat migration.
2. Ensuring there is at least 12 pipe diameters (12D) of straight pipe on the inlet of all circulators to reduce turbulence.
3. Sizing headers for a maximum flow velocity of 2 ft. per second to minimize head loss. Remember: Short/fat headers are good, long/skinny headers are bad.
4. Using a variable-speed, pressure-regulated circulator set for constant differential pressure mode to maintain stable differential pressure across headers. This eliminates the need for a differential pressure bypass valve and conserves input energy to the distribution circulator.
5. Provide proper orientation of purging valves.
6. Optional: Include an outdoor reset controller to vary temperature to distribution system based on outdoor temperature. If used, configure for minimum boiler inlet temperature high enough to prevent flue gas condensation in boiler.