

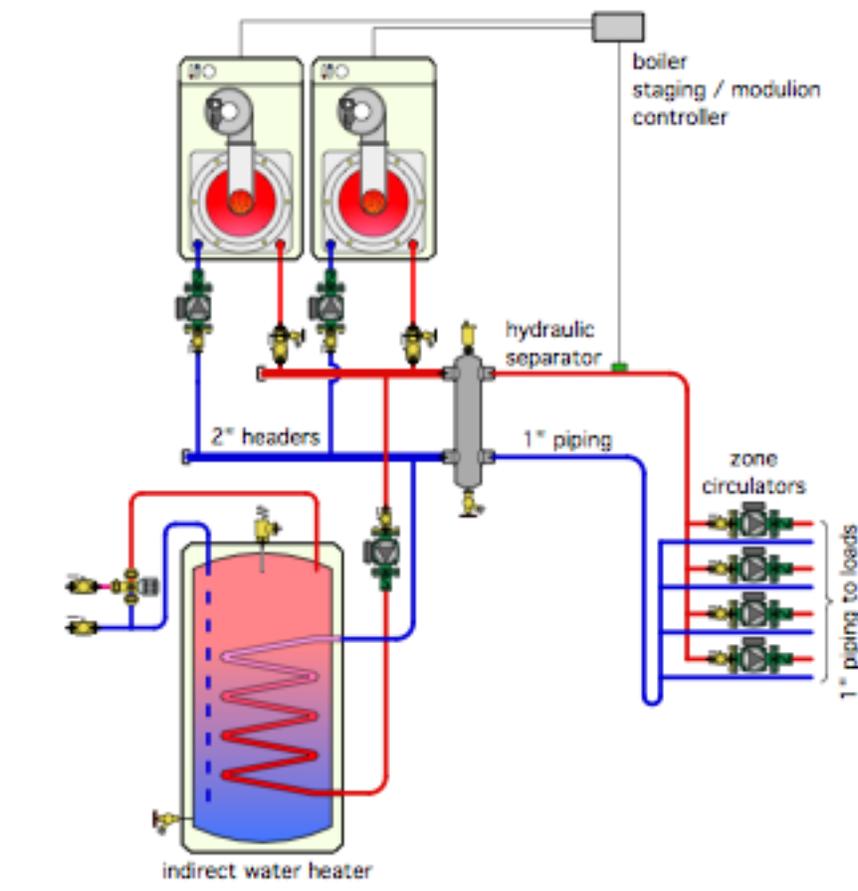
## Hydraulic Separators Need Help

### The Glitch

*Overview:* A multiple boiler system is being planned to supply several independently controlled heat zones. The system also includes an indirect water heater operated as a priority load. The load side of the system is piped with 1-inch copper tubing. Reverse return headers are all installed.

During domestic water heating mode, all space heating zone circulators are turned off to allow full boiler output to the indirect tank. During this time, both boiler circulators and the indirect tank circulator are turned on.

*Exercise:* Can you spot several incorrect or missing details in the schematic shown below?



## The Fix

In order for a hydraulic separator to achieve its goal, headers leading to the individually pumped load circuits must be generously sized (design flow velocity of 2 ft. /sec or less). If not, a significant pressure drop can develop along the length of both the supply and return headers. This pressure drop will cause some interference among the zone circulators. It's not the fault of the hydraulic separator, but rather the headers connected to it. This is also true on the boiler side of the separator.

When the header is generously sized there is no need for reverse return piping. The latter is appropriate when the same circulator supplies flow through several parallel piping circuits having similar flow requirements. This is *not* the way this system is configured. Why waste piping when it's unnecessary?

Another problem involves the indirect tank connected on the boiler side of the hydraulic separator. In this arrangement, the sensor for the multiple-boiler controller is not getting a good indication of the water temperature going to the load during the prioritized domestic water heating mode, and thus cannot control it properly. This has been corrected by moving the connections for the indirect tank downstream of the supply temperature sensor.

The coil heat exchanger inside the indirect water heater is also piped backwards. Hot water from the boilers should always enter the top of the coil to create counterflow heat exchange within the tank.

Other errors / omissions include:

1. Lack of purging valves on the zone circuits and indirect circuit.
2. Circulators piped too close to the header (and thus receiving turbulent flow into the impeller). There should be at least 12 times the pipe diameter of straight piping leading into circulators.

