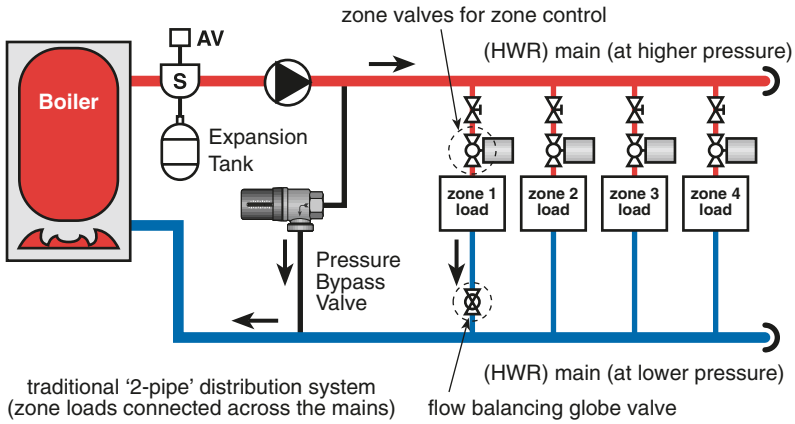
FIGURE 1

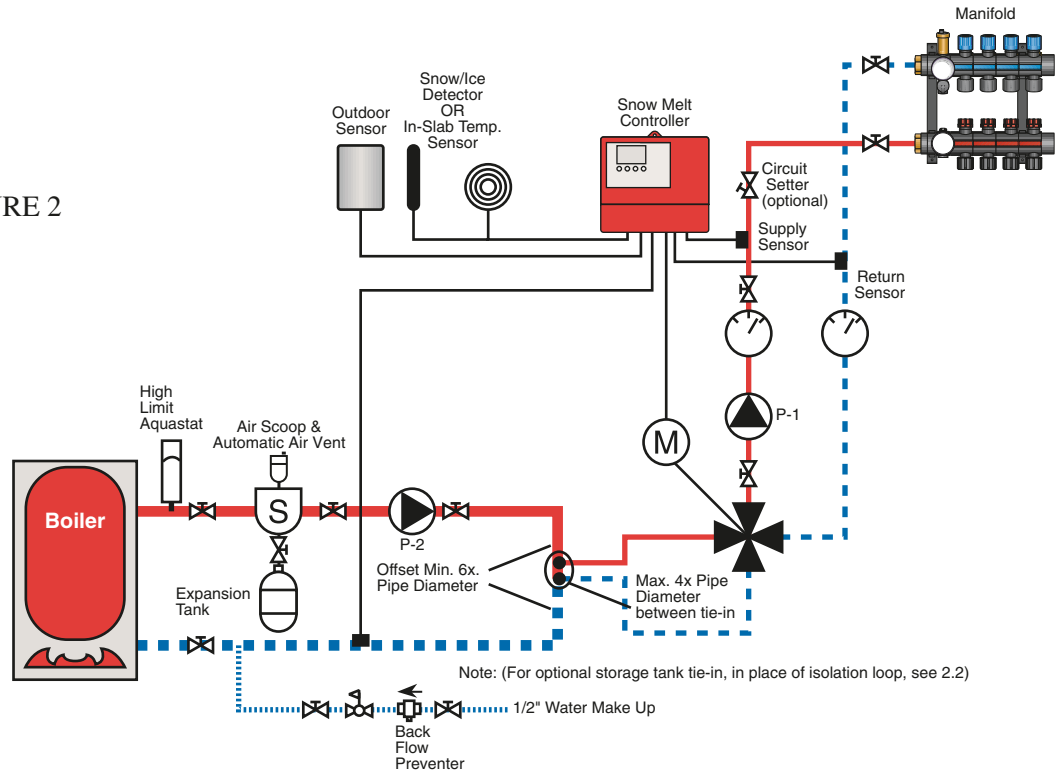


For years, the concept of piping the zone circuits across the headers (a two-pipe distribution system) has been well established and applied. A central circulator creates a pressure differential between the hot water supply and return mains. This pressure differential maintains flow through any piping path connected from the supply to the return mains. Adding a branch circuit is simply a matter of connecting across the mains

There are a number of ways to tie in a small area of floor heating application with a hot water coil system, and these depend on the type of floor heating being considered as well as how the system will be zoned. Most hot water coil systems are designed to operate at relatively high water temperatures (typically in the range of 180°F to 200°F), and do not use outdoor reset control. If the floor heating application being considered requires lower supply water temperature, a mixing valve must be installed between the high and low temperature portions of the system.

A four-way mixing valve is arguably the best approach, of course, pending the total gpm of the given radiant heating application. A basic radiant heating system using such a valve is shown in the figure below (figure 2). Note the closely spaced tees (no more than 4 pipe diameters apart) used to couple the radiant system to the source of hot water. These tees are meant to eliminate interference between the circulator in the radiant heating subsystem and any other circulator(s) in the system.

FIGURE 2



If the radiant system is tapped into a hot water coil circuit, it will lower the water temperature to hot water coils downstream from it. If those hot water coils were just sized for the zones they were meant for, without any safety margin, there could be a cold room callback in the making. Given the nature of the low temperature and the high thermal mass of a radiant heating system, a cool floor slab during cold start can easily grab much of the BTU away from the hot water supply. Therefore, it is better to have the temperature drop that is caused by the radiant subsystem accounted for, so that the number of passes of the downstream coils can be incremented accordingly. Of course, such a scenario can be easily avoided if the radiant heating subsystem is positioned at the end of the hot water supply chain.

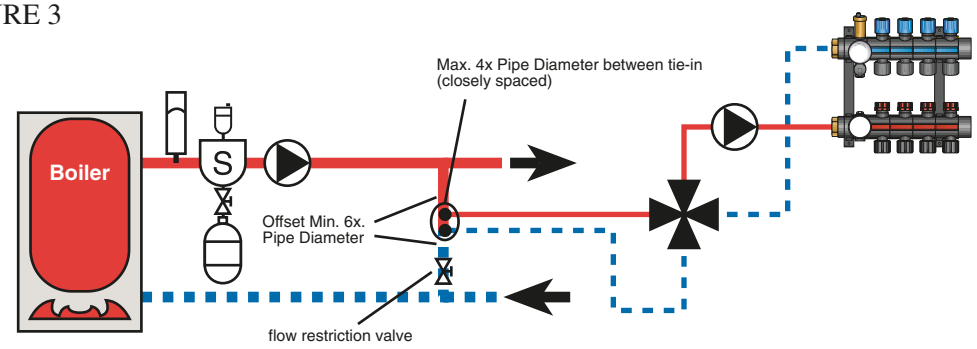
Tie-in Application

The figure below (figure 3) shows a method of supplying hot water to an independently controlled radiant heating system. It uses a wild hot water bypass loop, through which water flow is established whenever the main circulator is running. The system wiring must be configured to turn on the main circulator whenever the thermostat or slab sensor controlling the radiant system calls for heat.

When a globe valve is installed in the bypass loop, it can act as a flow-restricting valve. By partially closing the globe valve, a large portion of the main circulator's flow is prevented from racing through what may be a relatively low resistance flow path, thus depriving the other zones of their share of hot water. It is preferable to set this globe valve for a ΔT of approximately 40°F between the supply and return side of this bypass loop. This adjustment is to be made when the boiler and radiant system are operating at, or close to, normal design load temperatures. With a boiler supply temperature of at least 180°F, the return temperature to the boiler should be high enough to avoid the possibility of sustained flue gas condensation. .

It is essential to protect boilers from the possibility of sustained flue gas condensation, especially when a low temperature/high thermal mass distribution subsystem is involved. Of course, boiler protection depends on the size of the low temperature load relative to the high temperature load. A situation, where the heat distribution system (involving low temperature/high thermal mass) pulls BTU away from the water faster than the boiler can replenish it, should be addressed. A cool floor slab during cold start can easily strip BTU away from the water passing through it three to four times faster than under normal design load conditions.

FIGURE 3



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