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Domestic Water Recirculation Systems Part 2

Monday Morning Minutes | by R. L. Deppmann

Last week we left you hanging without the answer to an example problem:

Example: Suppose you have a 4-story commercial building. Let's assume the domestic hot water supply is a total length of 1000 ft. That is the entire pipe on all of the floors. Let's also assume an average of 15 BTU/hr/ft of loss through the supply pipe insulation. Now let's assume the recirc piping is 300 ft total at an average of 10 BTU/hr/ft of loss. What flow rate is required for a 10 degree ΔT? What flow rate is required for a 5 ΔT?

$$GPM = BTUH/(\Delta T \times 500)$$

Answer: If I have 1000 feet of supply pipe at 15 BTU/hr./ft. loss and 300 feet of recirc pipe at 10 BTU/hr./ft.; my total loss is (1000 X 15) + (300 X 10) = 18,000 BTUH. If I assume a 10° ΔT, my flow rate is 3.6 GPM. If I assume a 5° ΔT, the flow is twice that or 7.2 GPM. We would round these off to the nearest unit so the answer is 4 GPM or 8 GPM.


Gil Carlson

The total flow would really be calculated by floor and circuit so we can balance the correct flow for each floor and circuit. Gil Carlson, past Bell and Gossett engineer and author of many of the engineering design manuals, used to say, "A difference to be a difference has to make a difference". If the piping on the floors is relatively the same then we could just divide the total by the number of floors and balance to that number.

Each circuit should have a combination balance valve/flow meter like the Bell and Gossett LEAD FREE Circuit Setter. RL Deppmann recommends a minimum flow in any circuit of ½ GPM. Anything smaller than that is difficult to balance.

Why would we use 5° ΔT or 10° ΔT or even 20° ΔT? The lower the temperature at the fixture, the more water and time will be wasted waiting for hot water. The American Society of Plumbing engineers (ASPE) suggests a 5° ΔT with 120° supply. If the supply temperature is 140°, we believe a 10° ΔT will do just fine. Of course, always check for local codes before deciding which temperature drop to choose.

Next week, we look at pressure drop.