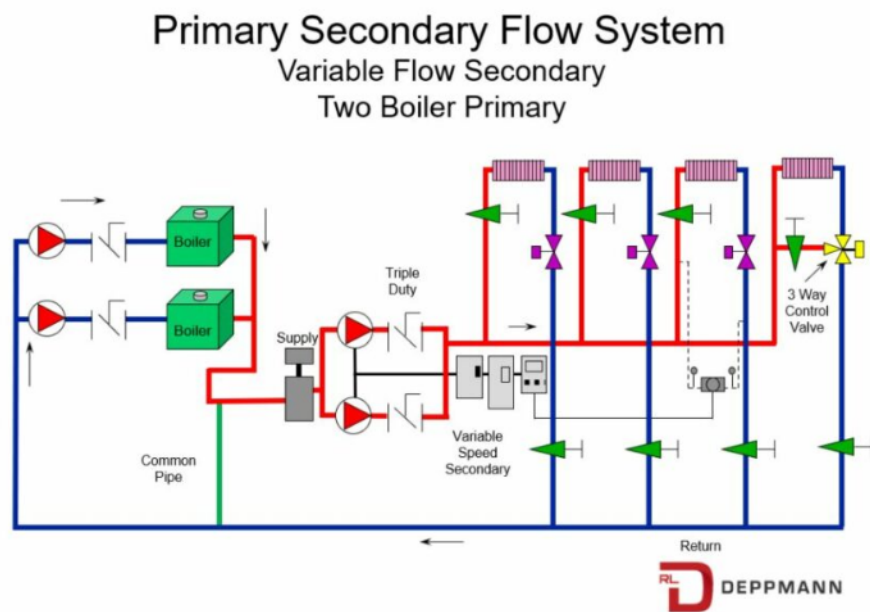


Monday, November 13, 2023

Condensing Boiler Specification - Part 4 – Primary-Secondary Thoughts

Monday Morning Minutes | by Norm Hall



Primary-Secondary pumping in hydronic heating systems is a tried-and-true method of protecting boilers while using variable speed pumps in the secondary or distribution loop. Today, many engineers immediately think of primary variable pumping in heating systems rather than primary-secondary. There are reasons to use the more traditional dedicated boiler pump and today we will look at a couple of the reasons.

What is Primary Variable vs. Primary-Secondary?

Once again, just as last week, let's level set on definitions before we get into the key concerns in a boiler plant. The difference between the two pumping system types is outlined in the [Condensing Fire-tube Boiler Heating System and Primary-Secondary Pumping](#) blog under the title, "A Quick Review of Hydronic Boiler Piping Schemes."

When might the engineer look at primary-secondary pumping for their condensing boiler plant?

Do You Have Control of the Distribution Flow Rates?

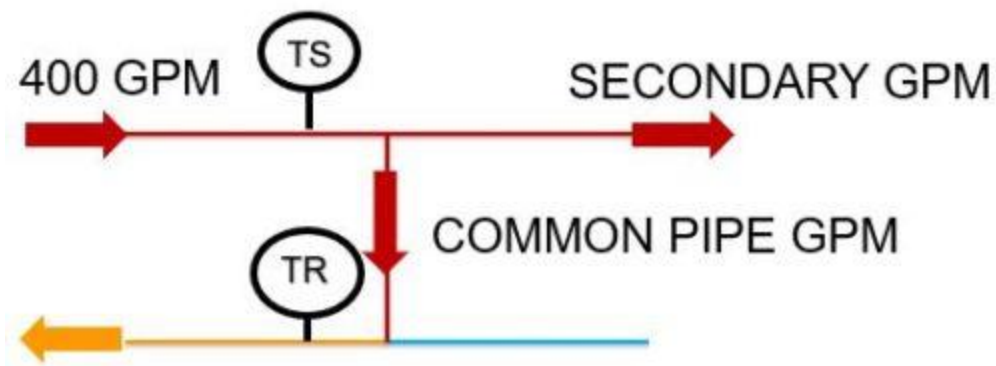
Almost all condensing boilers have a minimum required flow rate. Sometimes the minimum flow rate of multiple boilers operating at the same time is high enough that gaining positive control of the boiler flow rate through a dedicated boiler pump is prudent. I outlined this in the recent R. L. Deppmann Monday Morning Minutes, [Condensing Fire-tube Boiler Heating System and Primary-Secondary Pumping](#).

Another thought has to do with the engineer's risk. There are many times when the engineer is contracted to upgrade the mechanical room or boiler room and replace the equipment. They may or may not have an opportunity to redesign the distribution system or terminal units. Depending on the size and access to the distribution system, there may be questions about minimum flow rates and bypasses.

The engineer is not paid to examine and change the distribution system. The fees being paid for the design may not include enough funds for a comprehensive review of the distribution system. That said, if there is an issue with minimum flow, it will be their responsibility. This is a case where primary-secondary pumping with dedicated boiler pumps will make sense and provide a level of protection for the engineer.

Avoiding Some Boiler Cycling with Primary-Secondary Pumping

BRIDGE TEMP MIXING



One concern with the primary-secondary pumping system is the potential of cycling the boilers when the primary flow rate exceeds the secondary flow rate. One example of this is outlined in [Primary Secondary Piping and Water Tube Boiler Cycling](#).

Having the deep burner turndown in your boiler system will help reduce the amount of cycling. Having multiple properly staged smaller boilers may also help. Another great way to reduce the cycling is the use of variable speed primary pumps controlled by the boiler controller.

Smart ECM Primary Pumps Controlled Through the Boilers



One way to avoid excessive over-pumping of the primary loop is the use of a variable speed circulator with proper control. An example of this is the use of the B&G Ecocirc® XL. Here is a description of the use of this smart ECM variable speed pump in the condensing boiler system, [Using ECM Smart Circulator Pumps in Primary Pump Applications](#).

There is a real advantage to having the boiler controller as part of this energy-saving design. The boiler is already controlling the firing rate and turndown. The boiler could control the outlet temperature reset. The boiler is controlling the staging of the boilers.

Why not let it also control the speed of the primary pumps?

Next week in part 6 we will look at an example of an operating system with variable speed primary and variable speed secondary pumps.

Part 1: [Condensing Boiler Specification – Part 1 – Design Efficiency](#)

Part 2: [Condensing Boiler Specification – Part 2 – Boiler Temperature Reset Made Simple?](#)

Part 3: [Condensing Boiler Specification - Part 3 - Operation at Lower Loads](#)

Part 4: [Condensing Boiler Specification - Part 4 - Variable Primary Thoughts](#)