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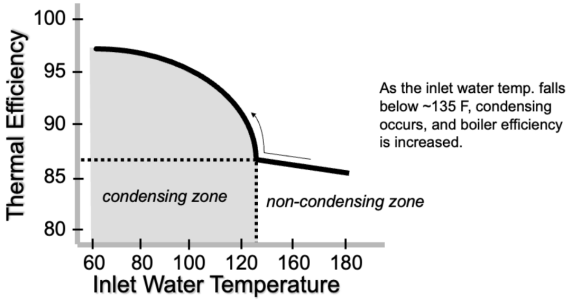
Monday, October 23, 2023

Condensing Boiler Specification - Part 2 –Boiler Temperature Reset Made Simple?

Monday Morning Minutes | by Norm Hall

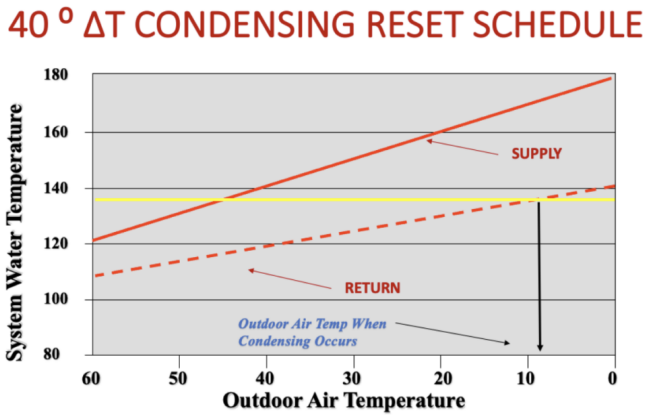
Last week we suggested using an efficiency less than the published maximum when selecting a hydronic condensing boiler for a comfort heating system. This week we will look at ways to take advantage of the increased boiler efficiency when condensing.



ASHRAE Equipment Handbook, Boiler Chapter

It's All About the Hot Water Return Temperature

A condensing boiler has a significant increase in efficiency when it is in condensing mode. Look at the graphic above. If we get the return temperature below about 135°F, the efficiency starts to rise. As the weather temperature rises above the cold winter design temperature, the load drops. We use the resetting of the system supply temperature to provide a smooth operation of the system and to save boiler fuel costs.

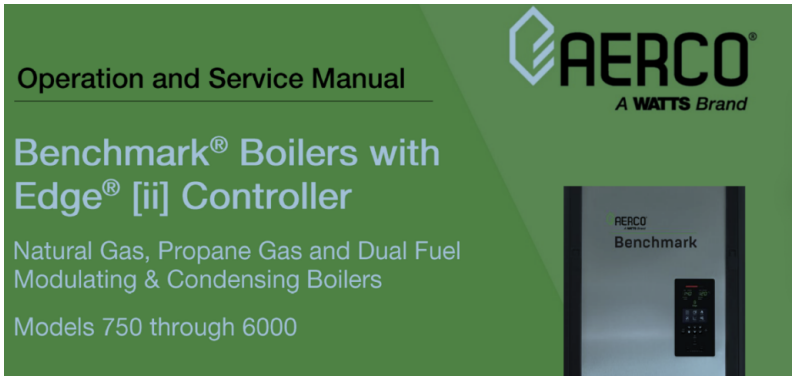


The example we used last week in Condensing Boiler Specification - Part 1 -Design Efficiency was an institutional system with a design condition of 180°F supply and 140°F return. If the system was designed for a 0°F outdoor air temperature, a reset schedule could look like the one above. We can see that the return temperature will put the boiler in a condensing mode for most of the year. This will greatly increase efficiency and lower the heating bills. Visit Condensing Boiler Temperature Reset for Increased Efficiency (Part 3 of 4) (deppmann.com) for more information.

Boiler Water Temperature Reset Made Simple

Boiler water temperature reset has existed for many decades. It can be programmed into the building control system, but there is another option. Today we do not think of a single boiler as a piece of equipment. Instead, we look at all the boilers, including the standby boilers, control valves, any primary pumps, and building owner alerts as one system.

It becomes so simple for the engineer when the boiler controls handle the boilers. It's one place to look during design, one place to review during submittals, and one place to call if there are issues. As an example, let's look at the Aerco Benchmark Edge Controls.



Aerco IOM

There are only two steps to having outdoor temperature reset on this boiler. The manual shown above has simple instructions.

1. Install and wire the outdoor temperature sensor which is available from Aerco when specified.

2. Enter the parameters.

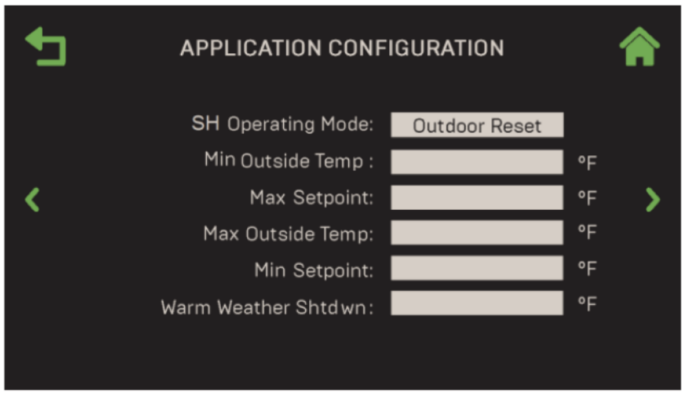


Figure 6-1: Application Configuration Screen

Aerco IOM

Here is the screen on the boiler controller. Look at the graph above and we will find the information we need.

1. Min Outside Temp is 0°F
2. Max Setpoint is 180°F
3. Max Outside Temp is 60°F
4. Min Setpoint is 120°F
5. Warm Weather shutdown is a choice but let's say 65°F.

The boiler plant now has outdoor reset operational. Simple and to the point when your boiler plant has controls as good as the Aerco Edge Controller.

Changing Traditional Temperatures in the Hydronic System

Today, many engineers are looking at ways to increase the boiler efficiency at design. They are also looking at systems designed for ways to use other heat sources in the future. Both involve lowering the supply and return temperatures, so the boiler plant is always in a condensing mode.

These systems merit discussion and action but will require larger or different terminal units and a change in traditional thinking within the engineering office. Worth mentioning in this blog since temperature reset may still be a viable addition to these newer designs.

Next week we will look at another way to increase the boiler plant efficiency with controls.