Chiltrix V18 Hydronic Backup Heater- Quick Overview

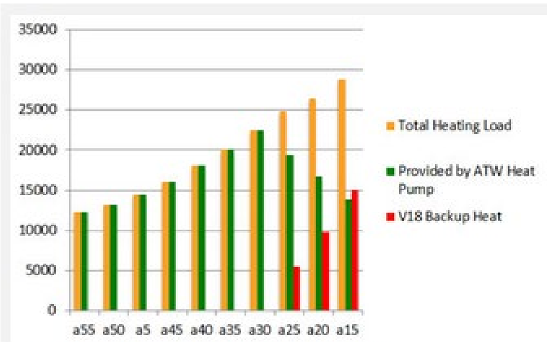
The fact is that in some air to water heat pump applications in cold climates, users may need backup heat at some point in the year. This need, if present, may be a good thing and may indicate a properly sized system, since often it is more proper to size for >/= 90% of the peak heating load than to size for the full load, particularly in a case where sizing for 100% to be provided without backup would require a much larger heat pump that would be grossly oversized most of the year, and/or have much higher cost. Across the industry, backup heat is generally accomplished by injecting additional heat into the loop from a resistance heater, typically elements inside a hot water heater installed somewhere on the loop. When backup heat is needed, a backup heat source is enabled, and the backup heater runs based on its own thermostat setting.

This is the way hydronic backup heating has always been done in Europe and Asia where hydronic heat pumps are the standard, as well as in the USA, where hydronic heating is only recently gaining traction. This method works and is used all over the world, however it is not ideal.

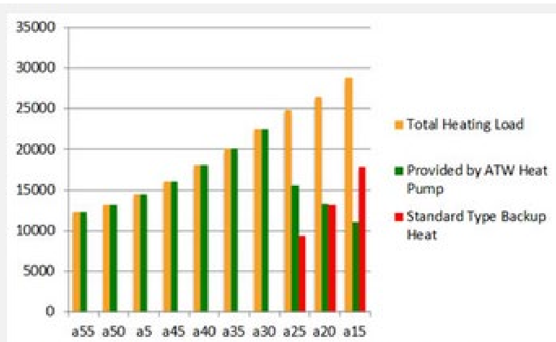
Regardless of sophistication level, ultimately a hydronic heat pump cycles on/off (or adjusts its speed) in response to temperature measured in the buffer tank or at some other point in the system. And when additional heat is injected into the typical system by an external source, controls interpret this as a reduction of heating load, which may then slow or cycle off the heat pump compressor. Further, traditional non-dynamic control of backup heat is an “on or off” proposition, meaning that is chases a setpoint, stops, falls behind, starts again resulting in over-shoot and under-shoot.

The aforementioned effects can produce a recursive loop that may cause the backup unit to actually become the primary, or at the least, can cause the backup source to provide a higher than needed percentage of total heat. Of course, when the lower efficiency source (resistance backup heat) is over-providing, the higher efficiency source (the heat pump compressor) is then under-producing (compared to what it is capable of), unnecessarily reducing the total net COP.

Used with a Chiltrix air to water heat pump, the patented V18 does not chase and overshoot a thermostat setting to control backup heat, rather, the load-aware Chiltrix V18 controller powers the heating element in a calculated variable manner to provide only the exact amount of backup heating power needed. The controls calculate the BTU of “shortfall” in real time and power the V18 dynamically to provide precisely that exact amount of heat. Using SSR technology, the V18 resistance element is able to operate at any of 100 different power levels between 0-100% thus matching the backup heater output precisely to any BTU shortfall, while continuously adjusting the power in real time (every six seconds) to match shortfall as it might change. This allows the Chiltrix compressor to always run at full speed when backup heat is active, keeping the highest efficiency part of the system running at full speed. This high level of accuracy can raise combined COP by up to 21% during backup heat operation. See more: http://www.chiltrix.com/hydronic-backup-heater/



Above: Ref. building with V18 backup heater.



Above: Ref building with standard tank backup heater.