

Optimize the Supply Air Temperature Reset Schedule for a Single-Duct VAV System

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The supply air temperature for a single-duct VAV system is usually set as a constant. Since this constant set point is selected to satisfy the maximum cooling load conditions, significant reheat will occur once the airflow reaches the minimum and the heating load increases. To minimize this simultaneous cooling and heating, the supply air temperature is often reset based on either return air temperature or outside air temperature. Researchers have reported significant energy savings by improving supply air temperature reset schedules. The impacts of optimized cold and hot deck temperature reset schedules on dual-duct VAV system have been described, however, not much work has been published that describes the optimal reset schedules for a single-duct VAV system. Resetting the supply air temperature not only impacts the cooling and heating energy consumption, but also the fan power consumption and the indoor air quality. If the reset is not done properly, it may cause indoor air humidity problems or result in fan power consumption penalty. The major factors have been investigated that impact the optimal supply air temperature reset schedule to minimize the overall heating, cooling energy and fan power consumption. Simulations have performed and that compare for systems with different interior area ratios, load conditions, minimum supply airflow rates, and thermal to electrical energy price ratios. HVAC system operators and commissioning engineers should keep these factors in mind when they develop the reset schedules for the supply air temperature in single-duct VAV systems.