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Dual Duct Terminal Units
The Basics

Dual duct systems are more expensive due to their parts and labor requirements. However, they also have many advantages. When these systems are well tuned, they can save a substantial amount of energy since they will only produce the amount of air required.

As the name would suggest, conventional single duct systems only have one duct that feeds all the zones. This means that the central unit either delivers cooling air at 55˚F (13˚C) or heating air around 90˚F (32˚C). The central unit must poll these zone demands to identify the majority which defines the required operating mode. If the single duct terminal unit is not equipped with “sub-cool” or “reheat,” it becomes a slave to the system and must wait for the mode to change to operate properly.

Taking a single duct terminal unit with duct reheat as an example, if the system is currently in cooling mode, but the zone is requesting heat, the single duct terminal unit will then use a reheat airflow set-point and activate the duct reheat. This means that air is treated once by the central unit to bring the temperature down to 55˚F (13˚C) and then treated a second time by the terminal unit to bring the temperature from 55˚F (13˚C) to around 90˚F (32˚C). This represents a lot of wasted energy. Similarly, if the central unit is in heating mode, but the zone is requesting cooling, the terminal unit can only close the damper to the minimum airflow setpoint to prevent the zone from freezing. The zone must wait for the central mode to change to cooling to satisfy the zone demand.

In dual duct systems, the central unit constantly produces cold air at 55˚F (13˚C), and heating air around 90˚F (32˚C) meaning both air temperatures are available at all times. The dual duct terminal unit decides what air is required to satisfy the zone. This means the air is only treated once by the central unit, either hot or cold, in the proportion required by the zones. If there is more demand for cooling, then the central system would produce more cool air and vice versa.

Similar to conventional systems, there are strategies available to reduce energy consumption by resetting the discharge temperatures [cold air could be reset at 60˚F (18˚C), and hot air lowered to 85˚F (29˚C) for example). This is helpful in mid-seasons where the outside air does not offset the building load as much. Pressure reset strategies could also be used to reduce fan energy.

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To resume, dual duct systems:

- Fast Acting on Zone Temperature Requirements
- Have Better Control Precision
- Save Energy
- Satisfy All Zones at All Times
- Do Not Require Duct “Reheat” or “Sub-Cool”

In next month’s article, we will discuss the zone controller options found in our products.