

Modulating Hot Gas Reheat

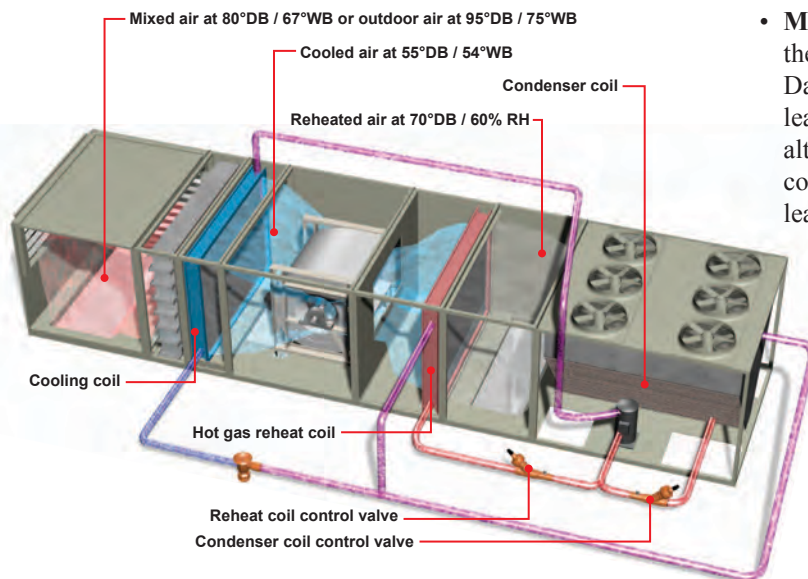
For Daikin RoofPak™ Applied and Maverick™ II Commercial Rooftop Systems

In a packaged rooftop system, hot refrigerant gas leaving the compressor can be channeled to a separate coil to reheat the air leaving the cooling coil, as pictured below. This reheat costs no energy and is an excellent way to optimize dehumidification. It is available as a factory-installed option on Daikin RoofPak applied rooftop systems and on Maverick II commercial rooftop systems.

For best performance, Daikin precisely controls or modulates the supply of the hot gas to the reheat coil. This modulation helps to maintain a constant, desired supply air temperature. Without it, supply air temperatures can vary significantly as the unit's compressors cycle on and off. See Figure 1.

Features

- **MicroTech®III controls** with integrated compressor and reheat control. Reheat is automatically energized whenever dehumidification is needed.
- **Modulating valves on both the condenser coil and reheat coil** for more precise modulation.



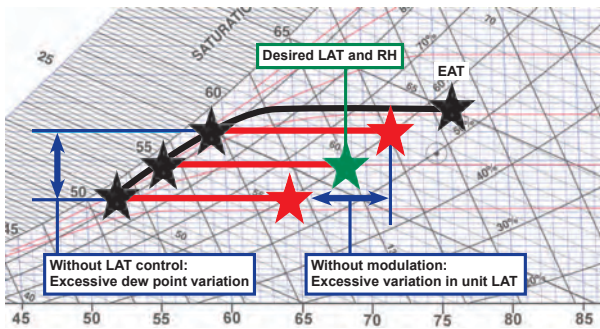
- **Enhancements on RoofPak systems that allow +/-1 degree of supply air temperature control.** These include an averaging discharge sensor and VFDs that modulate condenser fan speed and maintain a constant head pressure.
- **Microchannel reheat and condenser coils**, which are more robust than traditional fin-tube coils and more resistant to corrosion. Flat tubes and microchannel flow allow more heat transfer per square foot of coil. And, because microchannel coils require far less charge, refrigeration service is less expensive. No receivers or oil flushing cycles are required and subcooling is always provided. See Figure 3.

Benefits

- **Effective humidity control without using additional energy to reheat the cooled air.** Without hot gas reheat, a separate heating system would be required to reheat the cooled, dehumidified air to the desired level, which often violates ASHRAE 90.1-2007 guidelines. Or, higher humidity levels would have to be accepted in the conditioned space.
- **More consistent humidity and temperature control** in the conditioned space. Through compressor control, Daikin systems maintain a constant dew point in the air leaving the cooling coil (beware of inferior competitive alternatives). By modulating the hot gas to the reheat coil, Daikin systems are able to maintain a constant leaving air temperature. See Figure 1.

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Figure 1: Modulation prevents excessive variations in leaving air temperature (LAT) and allows $\pm 1^\circ$ LAT control



- **Meets requirements for LEED “charge per ton” credit.** Daikin rooftops with microchannel condenser coils require a charge of 1.0 lb or less of R-410A refrigerant charge per ton of cooling. Hot gas reheat adds an additional 0.2 lb (Maverick II) or 0.4 lb (RoofPak) per ton. This can earn you an extra LEED credit for Energy and Atmosphere in LEED for New Construction Version 2.2 (Credit EAc4 in LEED-NC v2.2).

Typical Applications

- **100% Outdoor Air units providing neutral air for terminal unit systems,** including fan coils and VRV DX systems, and supplying spaces with large ventilation requirements, such as hospitals and laboratories. In climates with outdoor air up to 95°F/75% RH (relative humidity) modulating hot gas reheat is the best way to provide 70°F/60% RH air to the conditioned space. See Figure 2.

Figure 2: Modulating hot gas reheat is the best way to provide dehumidified 100% outdoor air at 70°F/60% RH

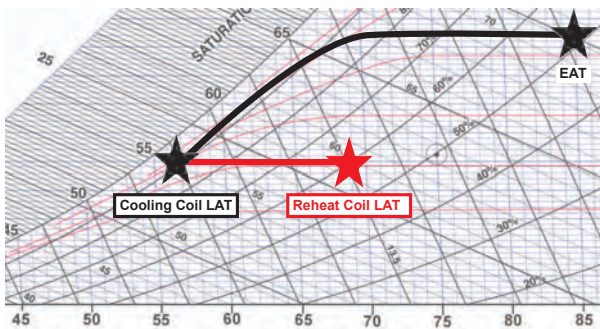
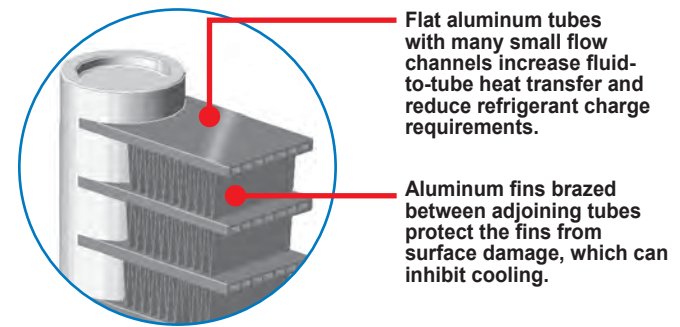


Figure 3: Microchannel coils improve heat transfer and reduce refrigerant charge requirements

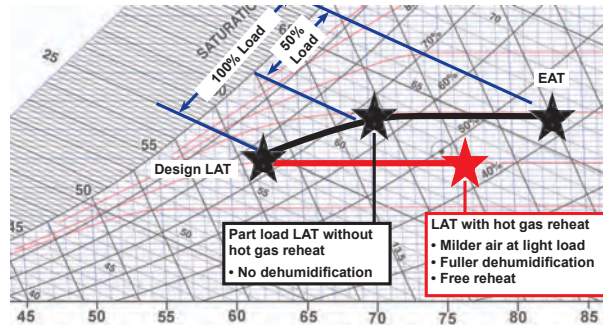


Flat aluminum tubes with many small flow channels increase fluid-to-tube heat transfer and reduce refrigerant charge requirements.

Aluminum fins brazed between adjoining tubes protect the fins from surface damage, which can inhibit cooling.

- **Variable air volume projects with challenging dehumidification requirements.** For these applications, the rooftop unit typically serves many zones under discharge temperature control. Since the controls maintain 55°DB/54°WB latent air temperatures, and always dehumidify, hot gas reheat is not mandatory. However, it offers a safety factor for humid climates and provides for free reheat.
- **Large single-zone applications,** especially with dense occupancy, such as churches, theaters and gyms. These systems cannot dehumidify at part-load without reheat because DX coil latent air temperatures rise at part load. Daikin controls allow more reheat at light loads and less reheat at heavy loads. The result is that the unit’s sensible cooling capacity adjusts to meet the required load. See Figure 4.

Figure 4: Hot gas reheat provides dehumidification at part load and a safety factor for humid climates



For more information

For more information on modulating hot gas reheat for Daikin rooftop systems, contact your local Daikin representative. To locate your Daikin representative or visit www.DaikinApplied.com.