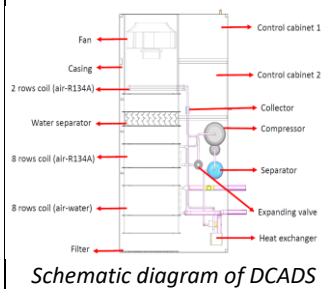


Dual Cycle Air Dehumidification System for Dedicated Outdoor Air System with application to Super Low Energy Buildings



As chiller consumes the largest amount of energy (over 50%) in ACMV systems and the ideal supply air temperature to the space is around 16°C~18°C for room temperature setting of 24°C~26°C, higher chilled water temperature is not only increasing chiller COP but also improve IEQ. However, the higher chilled water temperature reduces the capability of air dehumidification.

To solve this problem, Dedicated Outdoor Air System (DOAS) has been introduced to treat the ventilation air and control the space humidity, while a parallel water or air-water terminal system (fan coil units, chilled beams and/or radiant cooling units) modulate indoor air temperature. The separation of the sensible and latent loads provides a mechanism for dehumidification efficiently. DOAS overcomes the problems of VAV systems and offers the advantages of energy savings and improved indoor thermal comfort, etc. In addition, the advantages of reliability and humidity control can be more economically leveraged by specifying it only for the ventilation and dehumidification aspects of the system, allowing the ventilation air system to be sized and operated to provide the ventilation airflow rate required by local ventilation code for acceptable IEQ.

With the support from Building and Construction Authority (BCA), Air T&D has developed low cost and easy to implement “Dual Cycle Air Dehumidification Systems” (DCADS). Different from conventional AHUs, DCADS uses higher temperature central plant chilled water or VRF refrigerant to precool the air and then use a high efficiency internal heat pump to dehumidify the air to the required humidity ratio and reheat the air before discharge. DCADS makes full use of the high-efficiency and high-temperature central plant cooling energy to pre-treat the ventilation air by reducing its temperature and humidity. The total energy consumed by this part is over 75% while the deep dehumidification (as low as 4g/kg air) by high efficiency heat pump cycle handles the remaining load. Since the lift of the heat pump is very small, enable the whole system operate efficiently.

Project Principal Investigator: Wenjian Cai / Air T&D Pte Ltd.
Project supported by GBIC Product Prototyping

Applications:

- Dehumidification for Super Low Energy buildings

Capabilities:

- Flexible dehumidification capabilities
- Real-time monitoring and control
- Plug-and-Play system
- Integrated and adaptive building humidity control

Benefits:

- Reduce building energy consumption
- Improve occupant's comfort
- Intelligent control
- Easy maintenance

Contact Information:

enwae@hotmail.com

Air T&D Pte Ltd
25 Mandai Estate,
#07-07 Innovation Place,
Singapore 729930