



TECHNOLOGY

Separate Sensible and Latent Cooling System with Chilled Panels

OVERVIEW

In the US, over 80% of households have air-conditioning (AC) systems, either central systems or window mounted units. These AC systems consume up to 10% of a home's entire yearly energy usage. Conventional AC systems provide simultaneous sensible and latent cooling; hence the evaporating temperature of the refrigerant, usually 7° to 10° C, is much below the air dew point. Their efficiency is consequently limited by the large temperature lift from the evaporator to the condenser.

Researchers in the University of Maryland's James Clark School of Engineering have designed a system of separate sensible and latent cooling (SSLC) that overcomes this drawback by dedicating the function of the vapor compression system (VCS) to provide sensible cooling only, while a desiccant device is adopted to provide the latent cooling. The evaporating temperature of SSLC's VCS can be increased above the dew point and reaches 18° to 20°C, which results in a reduction of the temperature lift by around 10 K. Since the desiccant device consumes much less power compared to the VCS system, the average energy saving resulting from this reduced temperature lift is 30%. This design of an ultra-low energy use AC system is expected to have not only less energy consumption but also better thermal comfort.

Applications:

- Whole house and single room air-conditioning systems

Advantages:

- System combining desiccant and chilled water panels utilizes 30% less energy to achieve same cooling and better thermal comfort.
- Use of natural convective heat transfer to condition the space air at a lower air velocity reduces the fan power demand.
- VCS provides sensible cooling only, requiring less energy consumption.

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Additional Information

INSTITUTION

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PATENT STATUS

Patent(s) pending

LICENSE STATUS

Contact OTC for licensing information

CATEGORIES

- Industrial Processing

EXTERNAL RESOURCES

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