

MVHR Units with Integrated Cooling: A New Frontier in Energy-Efficient Ventilation (Part 1)

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1. Introduction

In response to evolving building regulations and the growing demand for energy-efficient solutions, Mechanical Ventilation with Heat Recovery (MVHR) units have become a cornerstone of modern building design. Traditionally focused on recovering heat from exhaust air to reduce heating energy, the latest advancements in MVHR technology have introduced integrated cooling capabilities. This bulletin explores the benefits, applications, and technical aspects of MVHR units with integrated cooling, highlighting their potential to enhance indoor comfort and meet stringent building standards.

2. Overview of MVHR Technology

MVHR units are designed to improve indoor air quality while maximizing energy efficiency. These systems extract stale air from inside a building and replace it with fresh, filtered air from outside. A heat exchanger within the unit transfers heat from the outgoing air to the incoming air, reducing the need for additional heating and ensuring a consistent supply of fresh air.

3. The Innovation: Integrated Cooling in MVHR Units

The integration of cooling into MVHR units represents a significant advancement in ventilation technology. These units now offer:

- **Combined Ventilation and Cooling:** By incorporating a cooling module, these systems provide cool, fresh air during warmer months, eliminating the need for separate air conditioning units. This innovation helps maintain a comfortable indoor environment year-round.
- **Enhanced Energy Efficiency:** With the combined functionality of cooling and heat recovery, these systems significantly reduce energy consumption. The heat exchanger works to recover heat during the winter months, while the integrated cooling module addresses cooling needs in summer, ensuring balanced and energy-efficient operation.
- **Space-Saving Design:** The dual functionality of these units reduces the need for additional cooling systems, resulting in space savings and simplifying the overall installation process.

- **Improved Indoor Air Quality:** These units continue to filter incoming air, ensuring that pollutants and allergens are minimized while maintaining optimal ventilation rates. The addition of cooling does not compromise the air quality benefits provided by traditional MVHR systems.
 - **BMS Integration:** The ability to integrate with a Building Management System (BMS) allows for centralized control and optimization of the ventilation, heating, and cooling processes. This integration further enhances the system's efficiency and adaptability to varying environmental conditions.
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4. Technical Specifications and Performance

While specific technical details may vary by manufacturer, typical MVHR units with integrated cooling share the following characteristics:

- **Heat Exchanger Efficiency:** High-efficiency heat exchangers typically recover up to 90% of the heat from exhaust air, contributing to lower heating energy requirements.
 - **Cooling Capacity:** The integrated cooling module provides sufficient cooling to meet the demands of most residential and commercial spaces, depending on the unit's size and design. However, the cooling capacity of the systems that are available on the market is not as efficient or powerful as that of a VRF system.
 - **Filtration:** Advanced filtration systems remove particulates and allergens, ensuring the fresh air supply is clean and contributes to a healthy indoor environment.
 - **Noise Levels:** These units are designed to operate quietly, ensuring that the additional cooling function does not introduce unwanted noise into the living or working space.
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5. Applications

MVHR units with integrated cooling are ideal for a variety of settings, including:

- **Residential Buildings:** Particularly in modern homes where space and energy efficiency are paramount, these units offer a streamlined solution for climate control. They are especially beneficial for meeting CIBSE TM59 standards, which focus on mitigating the risk of overheating in residential buildings. By providing both ventilation and cooling, these units help ensure compliance with these standards, enhancing occupant comfort and safety.
- **Commercial Buildings:** Office spaces, small retail environments, and other small commercial buildings benefit from the dual functionality, which reduces the need for separate HVAC systems.
- **Retrofit Projects:** These units are also suitable for retrofitting existing buildings, where space constraints and the need for improved energy performance make them an attractive option.

6. Benefits and Cost Implications

- **Energy Savings:** By reducing the need for separate heating and cooling systems, these units offer significant energy savings, particularly in climates with varying seasonal demands.
 - **Compliance with CIBSE TM59:** For residential projects, these units provide an effective solution to meet CIBSE TM59 standards, helping to prevent overheating—a key concern in modern housing design.
 - **Installation and Maintenance:** Although the initial cost may be higher than traditional MVHR systems, the long-term savings in energy costs and the reduced need for maintenance make these units a cost-effective solution.
 - **Environmental Impact:** The reduced energy consumption also contributes to lower carbon emissions, aligning with global efforts to mitigate climate change.
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7. Conclusion

The integration of cooling into MVHR units represents a significant leap forward in the quest for energy-efficient and sustainable building solutions. By combining ventilation, heat recovery, and cooling in a single, compact system, these units address the growing need for comprehensive indoor climate control without compromising on energy efficiency or indoor air quality. Additionally, their ability to help residential buildings meet CIBSE TM59 standards for overheating mitigation makes them an invaluable asset in modern construction. As this technology continues to evolve, it is poised to become a standard feature in both residential and commercial building designs, driving the industry towards more sustainable and comfortable indoor environments.

A second part of this technical article will follow, providing further analysis of various methods for proactive cooling in combination with Mechanical Ventilation with Heat Recovery (MVHR) systems.
