WAYS TO REDUCE AIR RESISTANCE OF CHANNELS IN VENTILATION SYSTEMS

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Abstract: *Proper ventilation is essential for maintaining a healthy and comfortable indoor environment. However, ventilation systems can often suffer from increased air resistance due to various factors, including friction, turbulence, and obstructions within the channels. This article explores effective strategies and techniques that can be employed to minimize air resistance, thereby enhancing the overall efficiency of ventilation systems.*

Keywords: *ways, reduce, air resistance, channels, ventilation systems.*

Introduction.

Efficient ventilation systems play a crucial role in maintaining a healthy and comfortable indoor environment. However, air resistance within the channels can hinder the performance of these systems, leading to increased energy consumption and reduced efficiency. To overcome this challenge, it is essential to explore ways to minimize air resistance within ventilation system channels. In this article, we will discuss various strategies that can be implemented to effectively reduce air resistance and enhance overall system performance.

City as one of the most complex anthropogenic structures is characterized by a great diversity of space. From micro- and mesoclimatological point of view it is a real mosaic of climates formed by buildings, artificial surfaces, green areas, elements of hydrographic networks and many other objects of various shapes and sizes. Urban areas form very rough surfaces and aerodynamic roughness of cities exceeds that of essentially all other types of landscape element which are essential for resistance to the wind field. The process of urbanization influences local changes of the surface and physical–chemical properties of the atmosphere, leading to the aerodynamic and other modifications of climate

Proper Duct Design:

The design of ventilation system ductwork significantly impacts air resistance. A well-designed duct system should minimize sharp bends, twists, and obstructions that create turbulence and increase air resistance. Smooth bends with larger radii and gradual transitions between duct sections can help maintain laminar airflow, reducing turbulence and subsequent pressure drops.

Appropriate Duct Sizing:

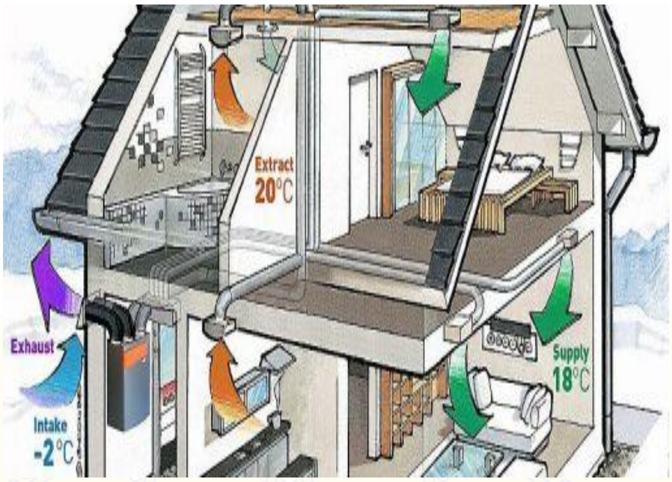

Figure 1. *the procces of mechanism*.

Correctly sizing ductwork is crucial for minimizing air resistance. Undersized or oversized ducts can lead to excessive pressure drops or inadequate airflow respectively. Following industry standards and guidelines for determining the appropriate duct size based on the airflow requirements ensures optimal performance while reducing unnecessary air resistance.

Use of Low-Resistance Materials:

Selecting low-resistance materials for constructing ventilation system channels can significantly reduce overall air resistance. Smooth-surfaced materials such as galvanized steel or fiberglass offer lower frictional losses compared to rougher surfaces like concrete or rough metal sheets. Additionally, internal lining materials with low friction coefficients further decrease air resistance.

Regular Cleaning and Maintenance:

Accumulated dirt, dust, and debris within the ventilation system channels obstruct smooth airflow and increase air resistance over time. Regular cleaning and maintenance routines are essential for ensuring optimal performance by removing any obstructions that impede airflow.

Balancing Airflow:

Properly balancing airflow throughout the entire ventilation system helps reduce air resistance by ensuring an even distribution of airflow across all channels. Balancing can be achieved by adjusting dampers, registers, and diffusers to optimize air delivery to various areas within the building.

Minimizing Leakage:

Air leakage through poorly sealed joints and connections can significantly increase air resistance in ventilation systems. Regular inspection and sealing of ductwork can help minimize leakage, reducing unnecessary pressure drops and improving overall system efficiency.

Efficient Use of Dampers:

Using dampers strategically to control airflow is vital for minimizing air resistance in ventilation systems. By adjusting the damper positions, it is possible to balance airflow while reducing turbulence and subsequent pressure drops within the channels.

Optimized Fan Selection:

The selection of appropriate fans based on the required airflow and system pressure can contribute to reducing air resistance. High-efficiency fans with adjustable speed settings allow for precise control over airflow, optimizing system performance while minimizing air resistance.

Conclusion

Furthermore, utilizing adjustable dampers and variable speed drives can contribute to reducing air resistance in ventilation systems. These components allow for precise control of airflow rates according to specific needs or changing environmental conditions. By adjusting the flow rates as required, pressure drops can be minimized, resulting in improved energy efficiency.

Lastly, it is important to consider the overall layout and positioning of ventilation system components. Properly sized ducts that match the required airflow volumes should be installed with minimal bends or turns whenever possible. Additionally, locating supply vents strategically near areas where conditioned air is needed most can help minimize resistance by reducing the distance traveled by air.

Minimizing air resistance within ventilation system channels is essential for ensuring efficient operation, energy savings, and a comfortable indoor environment. By implementing proper duct design principles, selecting low-resistance materials, regular cleaning and maintenance, balancing airflow, minimizing leakage, using dampers efficiently, and optimizing fan selection, it is possible to significantly reduce air resistance levels. These strategies collectively enhance the performance of ventilation systems while promoting energy conservation in various residential, commercial, and industrial settings.

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