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TECHNICAL BULLETIN

HVAC Energy Recovery Ventilation – A Failed Technology

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All ventilation HVAC Energy Recovery Devices leak air and contaminants back into the supply airstream. Leakage is present in every energy recovery ventilator and can occur through mechanical air leakage and particle adsorption and release. Air leakage rate is defined as Exhaust Air Transfer Ratio (EATR). EATR is the percentage of exhaust air and contaminants that is transferred to the outdoor airstream and is present in every single energy recovery application. This leakage rate can increase as the equipment ages and maintenance is neglected, often exceeding the 10% limit of EATR as defined by ASHRAE 62.1. With high exhaust air recirculation, energy recovery devices appear to have higher recovery efficiencies, but the reality is that efficiencies are lower than advertised.

Energy Recovery Devices are defective in their design and application. Given that every energy recovery device has some level of leakage, there will be transfer of air and contaminants such as bacteria and viruses from the exhaust air to the supply air. This creates a potentially unsafe condition in every application, especially schools, health care facilities, retirement and nursing homes, and hotels. Any level of leakage in these scenarios creates a major potential health risk that can lead to sickness and/or death. The purpose of outdoor air building ventilation is to remove these contaminants, not to reintroduce them into the building. When users are expecting 100% fresh outside air delivered to the space, anything less could be potentially dangerous.

In an April 14, 2020 position document [1], ASHRAE recommends bypassing energy recovery ventilation systems that leak potentially contaminated exhaust air back into the outdoor air supply. The same position document recommends higher rates of outdoor air (up to 100%), improved air filtration (MERV-13 or better), continuous equipment operation and properly maintaining temperature and humidity. All of these conditions can be met with modern, energy efficient, DOAS equipment without the use of energy recovery ventilation.

Energy Recovery Devices fail the economic test. The upfront cost of adding these devices to modern HVAC equipment can increase the cost of equipment and installation up to 50%. This leads to impractical returns on investment. Not only do these options increase first costs, but they trap the user into paying long term recurring and unexpected maintenance, operational and energy cost for the life of the equipment. Specifying energy recovery equipment often places the end user at a major economic disadvantage. Modern DOAS equipment is inherently more energy efficient, reducing the need to recover energy in the first place.

The health safety, maintenance and economic disadvantages of energy recovery devices far outweigh the potential benefits. Sizing and selecting DOAS and RTU equipment without energy recovery is a safer and smarter long-term decision.

References:

1. ASHRAE Board of Directors, “ASHRAE Position Document on Infectious Aerosols”, April 14, 2020.

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