The Architects of Indoor Air Quality

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The Imperative for HVAC Design and Facility Engineers in Optimizing Indoor Air Quality

Introduction:

The importance of public health has been underscored by critical areas of focus such as clean water, food safety, sanitizing and outdoor air quality; Unfortunately, the quality of indoor air often remains in the shadows, despite its significant impact on our well-being - The COVID-19 pandemic brought this into sharp focus and through a groundbreaking study conducted in Italy's Marche region, and published in "Frontiers in Public Health" as part of the Research Topic "Adaptive Design Solutions to Buildings and the Built Environment" – it has been empirically shown that increasing filtration and ventilation can help stem transmission of pathogens in schools and other densely populated environments - Though this should be of little surprise, many companies still make cost based decisions when it comes to filtration rather than prioritizing indoor air quality and seeking solutions that optimize it; much has been learned over the past few years to help change the perspective on indoor air quality, but many companies are still playing catch-up.

In this article, we will emphasize the pivotal role of air intake filters (commonly called cottonwood filter screens) in

combination with high MERV (Minimum Efficiency Reporting Value) rated internal filtration systems in achieving optimal indoor air quality (IAQ). Additionally, we will explore the profound positive impact of a healthier environment on the workforce by reducing illnesses and increasing worker productivity.

Elevating IAQ through Synergy

IAQ is a complex web of interrelated factors that demand the expertise of HVAC design engineers, air filtration experts and the proactive engagement of facility and building managers; together, they hold the keys to ensuring that indoor air remains safe, clean, and healthy, benefiting both the occupants and the overall efficiency of the building. HVAC design engineers are the architects of indoor comfort and safety. They bear the responsibility of designing air movement systems that integrate the correct equipment and filtration needed to ensure the air quality inside the building is optimal.

Integrating Air Movement Equipment and Filtration

Good IAQ starts with Air Intake Filtration (Commonly called Cottonwood Filter Screens) – These filters are often an unsung hero in the quest for clean indoor air. Cottonwood Filter screens are typically positioned on the outside of the building over the fresh air intake louvers / hoods and serve as the first line of defense against outdoor contaminants. By preventing debris like leaves, insects, pollen, dust, cottonwood seed, etc., from infiltrating the ventilation system, they play a pivot-

Cottonwood Filter Screen in front of intake hood with pleated filter down stream of airflow.

al role by delivering higher quality fresh outdoor air to the inside air movement system. The responsibility of integrating cottonwood filter screens initially falls on HVAC design engineers during the design phase – But after that, it is the Building Engineers that dedicate themselves to maintaining the standards established by the system design. Use of Cottonwood Filter Screens help ensure that the air entering the building envelope is clean and free from debris and bacteria carrying pollutants, establishing the foundation for better indoor air quality.

Selecting High MERV Filters

High MERV rated filters are the workhorses of indoor air quality. They capture a wide range of airborne particles, from allergens and dust to bacteria and viruses. Design engineers are often tasked with selecting filters that efficiently filter incoming air from the outside and its circulation throughout the building – Deciding what level of filtration to use is critically important as the decision directly affects IAQ and the health of building occupants. Carefully chosen, high MERV filters (MERV 13 or higher) can remove pathogens, including viruses like COVID-19, contributing to healthier indoor air and reduced health risks. As an added layer of defense, use of UV light in the duct system especially around condensate coils, can kill mold, mildew spores and fungus, further enhancing the indoor environment.

The Responsibilities of Facility and Building Managers

Facility and building managers are the stewards of IAQ and play a critical role in ensuring that the systems designed by HVAC engineers are effectively implemented and maintained. It is advisable to integrate the Cottonwood Filter Screens on the outside with high MERV rated filters downstream as the combination of the two helps provide optimal indoor air quality that neither one on its own can efficiently achieve.

Optimizing indoor air quality requires an ongoing commitment to engaging the right filtration and air treatment systems to ensure sustained performance; it is not a one-time event, but an ongoing process to ensure that IAQ remains at its best. This proactive approach, which includes selecting the right filters and regular filter changes or cleaning, safeguards the health of the building's occupants and contributes to a healthier, cleaner, and safer indoor environment.

Enhancing Workforce Well-being

The impact of IAQ on the workforce is a vital consideration for facility and building managers. A healthier indoor environment directly reduces the risk of illnesses, resulting in fewer employees falling ill and less downtime, ensuring that operations run smoothly and efficiently. Cleaner indoor air contributes to a happier, healthier, and more productive workforce. Facility and building managers should recognize that investing in IAQ, is investing in employee well-being and productivity.

The Impact of Budget-Based Decisions on IAQ

Pursuing budget-based decisions over IAQ-based decisions can have negative consequences. Facilities engineers sometimes opt for lower-cost filtration solutions with lower MERV ratings, compromising the IAQ. While this approach may seem financially prudent in the short term, it can lead to a host of long-term issues, including:

1. **Compromised IAQ:** Lower MERV-rated filters capture fewer contaminants and are less effective in maintaining high IAQ. This leads to an increased presence of allergens like mold, dust and harmful pathogens.

2. **Health Concerns:** Poor IAQ can result in increased respiratory illnesses among occupants, contributing to higher absenteeism and reduced worker productivity.

3. **System Efficiency:** HVAC systems may become less efficient due to increased filter clogs, leading to higher energy consumption and maintenance costs.

Collaborating with Filter Experts

To achieve the highest standards of IAQ, and HVAC system performance, HVAC design and building engineers should consider collaborating with filter experts, if not already doing so. These experts have specialized knowledge of filtration products and can help select the optimal filters for specific HVAC equipment and environments. By understanding the unique needs of the building, including factors like occupancy, air quality goals, and potential contaminants, building engineers with the help of filter experts can help choose the right filter combinations to ensure that IAQ and equipment performance goals are achieved.

Air Movement Equipment: The Lungs of the Building

To achieve optimal IAQ, it's not enough to rely solely on filtration. Proper air movement equipment is an equally critical aspect of the equation. Imagine the HVAC system as the lungs of the building. It breathes in air, filters it, and exhales clean, fresh air. The more frequently the air movement equipment can turn over the air, the healthier the IAQ. Design Engineers are well served when specifying air movement equipment that provides high air turnover rates – Although air turn-over rates may vary depending upon the size of the space, occupancy and use, the Centers for Disease Control (CDC) recommends 5 – 6 air turnovers per hour for schools and occupied office space – however, the larger the space the greater the number of turnovers that will be required to filter out allergens and pathogens.

Leveraging Cottonwood Filter Screens for Enhanced IAQ

Cottonwood filter screens play a pivotal role in delivering higher quality air into the indoor environment; positioned at the point where outdoor air is first drawn into the building, these screens function as a barrier against outdoor contaminants, helping prevent debris from entering the building envelope. By stopping airborne debris at its point of entry, they ensure that the air drawn into the HVAC system provides an optimally clean air baseline while preventing the premature face loading of the internal filters so they can do their job.

Conclusion: Prioritizing Health and IAQ

In conclusion, achieving optimal indoor air quality is a conscious decision that necessitates a balance between budget / cost considerations and IAQ priorities. The positive impact of a healthier environment on the workforce, in terms of reduced illness and increased worker uptime, is a substantial return on investment. Proper air movement equipment and the use of cottonwood filter screens with high MERV rated filters are integral components in this quest for healthier indoor air. It's time to elevate the conversation on IAQ and recognize that the decision to invest in clean air is a decision to invest in the well-being and productivity of all occupants. The long-term benefits far outweigh the short-term cost.

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Reference:

1. Frontier Public Health. 2022 Dec 9; 10:1087087. Doi: 10.3389/fpubh.2022.1087087. eCollection 2022. This study provides valuable insights into the impact of air exchange rates on reducing the transmission of SARS-CoV-2 and is a significant contribution to our understanding of indoor air quality.