

Beyond Filtration: Why Humidity is the Hidden Force Multiplier for Air Quality

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When we talk about indoor air quality, the conversation almost always starts, and often ends, with filtration. We specify MERV ratings, install HEPA filters, and design systems to capture microscopic particles. Filtration is essential, but what if we're missing a critical lever that can make every filter in the system work better?

Humidity isn't just a comfort metric. It's a force multiplier for air quality. By raising relative humidity (RH) to optimal levels, typically in the 40–60% range, we fundamentally change how airborne particles behave. Fine particulates like PM_{2.5} (particles smaller than 2.5 microns) become heavier, clump together, settle faster, and are more readily trapped by filters. Put simply, you're not just cleaning the air. You're calming it.

The Physics of Humidity and Particulate Matter

In dry air, small particles stay airborne longer. They remain suspended due to their tiny size and low mass, making them harder to capture and easier to inhale deep into the lungs.

This is especially true for PM2.5, a class of particles linked to respiratory disease, cardiovascular issues, and overall mortality.

However, when humidity rises:

- Hygroscopic growth: Many particles absorb moisture and grow in size.
- Agglomeration: Increased moisture encourages particles to stick together, forming larger clumps.
- Settling velocity: Heavier, larger particles settle out of the air more quickly.
- Filtration efficiency: Filters perform better at capturing larger particles.

In essence, controlling humidity doesn't replace filtration, it supercharges it.

The Overlooked Link in Healthy Building Design

Modern building design often emphasizes air exchange rates and filtration while neglecting humidity control. This creates a missed opportunity.

Especially in environments where ultra-fine particulate matter is a concern, like healthcare facilities, labs, offices in polluted urban centres, or even schools near busy roads, humidity management can make filtration systems far more effective.

Yet, HVAC systems often actively dry the air during cooling cycles, pushing RH well below optimal levels.

Without deliberate humidification, we're handicapping our own investments in air cleaning technology.





Health, Comfort, and Cost Savings

Maintaining RH between 40% and 60% doesn't just help filters. It also:

- Reduces the survival of many viruses and bacteria in the air and on surfaces.
- Improves occupant comfort and reduces complaints about dry eyes, skin, and respiratory irritation.
- Protects building materials and furnishings from excessive dryness.

By calming the air, making it less turbulent with fine, hard-to-capture particles, we create healthier, more comfortable indoor environments, often with reduced energy and maintenance costs over time.

The Big Picture: Humidity as a System-Level Strategy

Humidity control shouldn't be an afterthought. It should be a deliberate part of an integrated air quality strategy. A properly designed HVAC system that actively manages humidity alongside filtration and ventilation delivers vastly superior outcomes.

When you raise humidity to optimal levels, you're not just cleaning the air. You're changing its very dynamics, slowing it down, settling it, making it easier to control.

In a world obsessed with clean air, that's a quiet superpower we shouldn't ignore.

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