

# COVID-19 Impact on Ventilation

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# What We're Working On

## Project Stats


- ▶ 32 Passive House projects
- ▶ 10561 Apartment Units

## Trends


- ▶ Boston permitting requirements
- ▶ Electrification

# COVID-19 Work in Community



 **I Build NH** • 1st  
Let's Build NH Together – NH Sector Partner Initiative  
57m • 🌐

Great coverage from [Reaching Higher NH](#) about the planters students in Portsmouth High School Career and Technical Center's Architecture/ Design Build class made last winter! #CTE #IBuildNH



Concrete Makeovers: Portsmouth CTE students design planters to beautify outdoor dining

[reachinghighernh.org](#) • 6 min read

# Learning Objectives



Learn ventilation basics for controlling indoor contaminants



Learn how typical ventilation system for PH multi-family application performs considering COVID-19



Learn how to prioritize measures to reduce indoor COVID-19 risk

# COVID-19 Basics

- Air Borne Transmission
- Duration and Concentration
- Outdoors vs. Indoors

Back of napkin math:

- ▶ Assume 25x25 classroom with 10' ceiling
- ▶ Assume 1 mile per hour breeze
- ▶ Imagine two of the four walls are missing
- ▶ Resulting ACH (air changes per hour) would be more than 200!



# Ventilation Basics

## Virus

Virus as a  
Contaminant  
Source

## Source Control

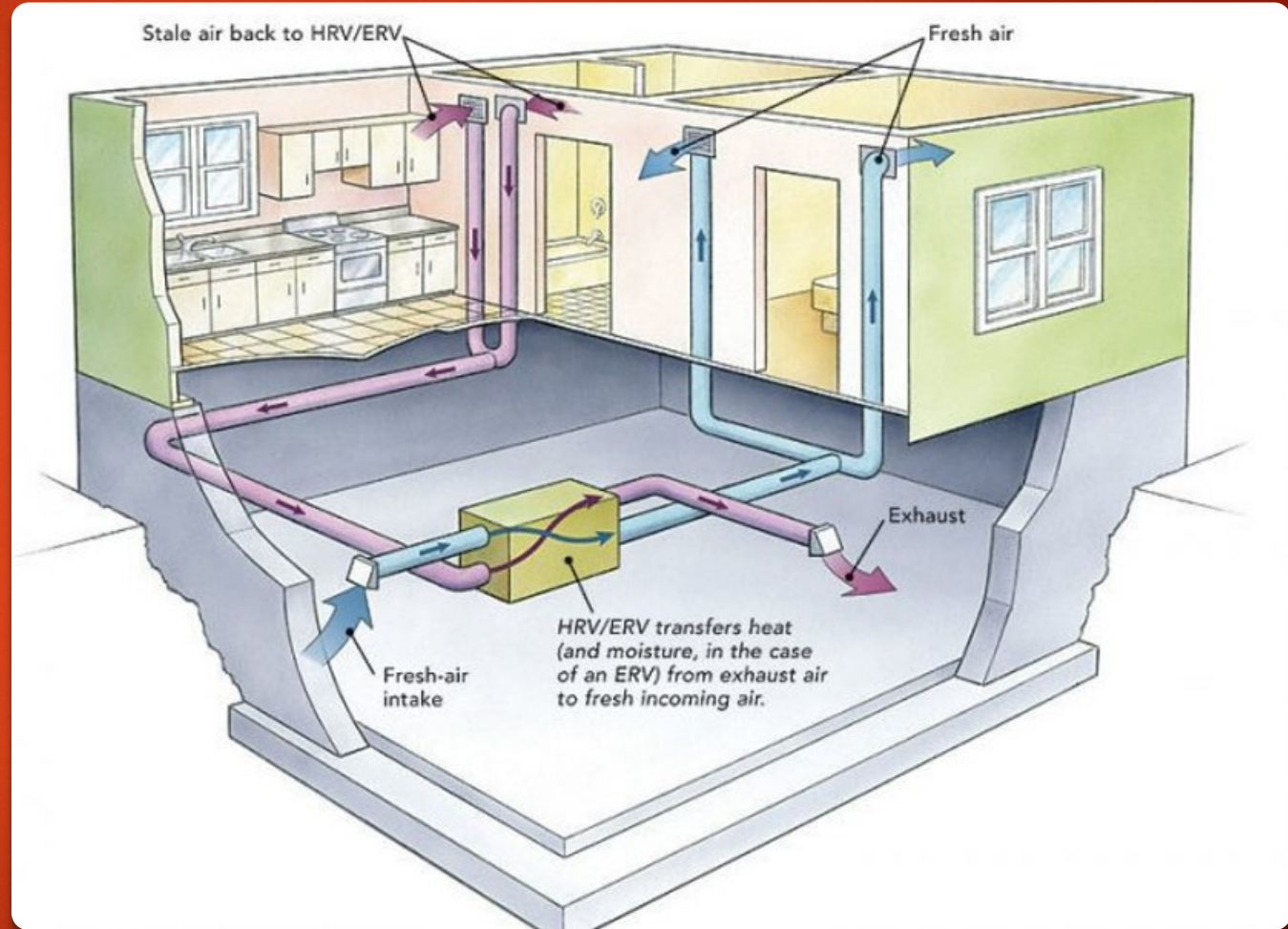
- Masks
- Avoid assembling indoors
- Vaccination

## Dilution Control

- Open windows
- Increase ventilation
- Filters

# Typical Multi-Family PH Design

+ Tempering & Dehumidifying  
Fresh Air Supply



# Hardened Values For Design



Simple solutions have a better chance of working



Buildings should be easy to maintain, easy to operate, and durable



Keep controls simple



# Looking Through a COVID-19 Lens at Typical Design

- ▶ DOAS is 100% OA with no recirc
- ▶ H/C FCU can accommodate a MERV 13 filter
- ▶ Apartments have operable windows
- ▶ Apartments are isolated from other apartments
- ▶ Easy to add a low cost but effective plug-in HEPA filter



# Concerns

- ▶ Energy Use from Open Windows
  - ▶ Wufi model vs. Actual Energy Performance

# Concerns

Duct Class	½ in., 1 in., 2 in. wg	3 in. wg	4 in., 6 in., 10 in. wg
Seal Class	C	B	A
Sealing Applicable	Transverse Joints Only	Transverse Joints and Seams	Joints, Seams and all Applicable Wall Penetrations
Leakage Class			
Rectangular Metal	16	8	4
Round Metal	8	4	2

**Table 5–1 Recommended Leakage Classes**

1. Duct Class = Toughness
2. Seal Class = What joints to seal
3. Leakage class = Performance

# Increasing Ventilation Rates

SMACNA DUCT CLASS,  
SEAL CLASS,  
LEAKAGE CLASS

# Ionization

Doesn't appear to work, may even be a hazard

## Electronic Air Cleaning, Open Letter from Experts, April 12<sup>th</sup>, 2021

"... We appeal to school district facility managers and administration leadership, as well as the relevant national and international bodies and Architecture, Engineering and Construction (AEC) industry consultants and professional organizations, **to recognize the unproven nature of many electronic air cleaning devices.** Such devices are typically electrically powered air-cleaners intended to remove particles from airstreams or to inactivate pathogens. As they are unproven, it is critical to avoid wasting valuable emergency COVID relief aid dollars installing them within school district facilities.

**Studies (ref: 1,2,3,4,5) indicate a much lower degree of effectiveness** in real-world conditions than typically claimed by manufacturers. **Studies (ref:1,3,4,5,6,7,8) also indicate that chemical compounds at harmful concentrations can be produced** in real- world settings, directly as a part of the process or as byproducts created from the chemical reactions occurring within the space. In the absence of regulation and with presently very little peer-reviewed research, significant questions remain regarding effectiveness and the potential impacts on human health..."

*-Open Letter To Address the Use of Electronic Air Cleaning Equipment in Buildings by Marwa Zaatari and Marcel Harmon*

What's Next?

# Measurement & Verification – CO<sub>2</sub>, VOCs, particulate

D.C Public School System  
A Conversation about Schools, Air Quality and COVID-19  
August 21st, 2021 (19 min)  
<https://youtu.be/4uUONteywAA>

- **Add MERV 13 where possible**
  - **Add portable HEPA where not**
  - **Increase ventilation rate**
- M&V CO<sub>2</sub>, VOCs, PM<sub>2.5</sub>**

An interview/discussion between Patrick Davis, Chief Operating Officer of the DC school system and Raj Setty, the CEO and Chief Engineer of Setty & Associates.

Thank You