

# Ventilation in Schools

This guide provides information to answer some of the most common questions regarding ventilation or indoor air exchange to improve indoor air quality and promote health in schools. This information is intended for superintendents, principals, school board members, facility managers and other school staff.

## Let us introduce ourselves!

The Pediatric Environmental Health Specialty Units (PEHSU) are a network of interdisciplinary pediatric environmental health specialists based at academic medical centers throughout the continental United States. The goal of the PEHSU program is to increase awareness and knowledge of pediatric environmental health.

## Improving environmental health in schools

Student success in the classroom has been shown to be related to and influenced by temperature, ventilation adequacy, relative humidity, carbon dioxide levels, presence of noise, and concentrations of indoor pollutants and contaminants.<sup>2</sup> Higher rates of respiratory irritation, illness and absenteeism, and asthma have been identified in schools with inadequate ventilation and higher rates of absenteeism.

### The two most common types of ventilation systems in schools are:

- Unit Ventilators
- Packaged Units (typically located on a Rooftop or in a Mechanical Room).

## A well ventilated school building has the following:

- **Local Exhaust Ventilation**  
Removes moisture, odors and other pollutants at the source<sup>1</sup>
- **Heating, Ventilation and Air Conditioning (HVAC) Systems**  
Introduces fresh air and reduces contaminants through filtration and dilution
- **Controlled airflow throughout the facility**  
Stops air from carrying dirty, uncontrolled contaminants around and into the occupied spaces of the school

## Important questions to assess indoor air quality and identify environmental concerns

- Are bathroom, workroom and kitchen exhausts present, operational and in use?
- Do staff bring in portable fans and heaters?
- Can systems monitor for CO<sub>2</sub>, temperature and relative humidity?
- Are all combustion appliances vented/exhausted properly?
- Are there rooms without windows?
- Are there rooms without vents?
- Is condensation observed on surfaces?
- Do windows routinely fog up?
- Are there complaints of lingering odors?

## Considerations

- Bathrooms
- Locker rooms and shower areas
- Workrooms (over laminators and copiers)
- Boilers, furnaces, hot water heaters
- Clothes dryers
- Kitchen ranges



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## Components

### Unit Ventilators:

- Unit ventilators are sometimes referred to as packaged units (e.g., roof top or ventilation area)
- Variety of configurations
- Disadvantages include poor control (specifically for humidity) and lower efficiency



### Chillers:

- A device that moves heat from liquid using vapor compression
- Commercial chillers utilize four main components: Compressor, Evaporator, Condenser, Metering device
- Operate with a closed-loop system, which means that the coolant remains in the chiller and is recycled across many uses



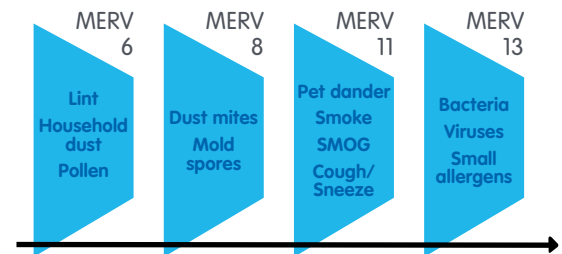
### Boilers:

- Commonly used to produce water/steam for various industrial processes. They are used as part of a heating system or to individually heat water
- Condensing boilers are also more preferred compared to the conventional types because of their larger and more efficient heat exchangers



### Filters:

- Filtration is the most common method of air cleaning
- MERV Filter Rating System is used to describe the efficiency of HVAC filters to capture particles
- MERV 13 or higher is recommended



### References

- <sup>1</sup> Safeopedia. Local Exhaust Ventilation (LEV). 2019. Retrived Sept 2022.
- <sup>2</sup> Environmental Protection Agency. Indoor Air Quality & Student Performance. 2003. 402-K-03-006.

### Resources



Indoor Air Quality



HVAC Systems



Frequently Asked Questions



ASHRAE



MSPMA

If you have questions that are not answered here, please visit [Mid-America Pediatric Environmental Health Specialty Unit \(MAPEHSU\) Children's Mercy Kansas City webpage](#) at [cmkc.link/MAPEHSU](https://cmkc.link/MAPEHSU) for further guidance. If you cannot find answers to your questions online, call our PEHSU hotline at **(800) 421-9916** or email us at [mapehsu@cmh.edu](mailto:mapehsu@cmh.edu).

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