

HVAC Systems: Heating, Ventilation and Air Conditioning

Four important questions schools should ask when choosing or assessing your district's HVAC systems.

Question 1: Who performs your school's HVAC system assessments & what are their qualifications?

Schools and School Districts should have HVAC systems evaluated routinely, with older systems looked at annually to confirm effective operation and acceptable performance. Acceptable performance will vary depending on type(s) and age(s) of equipment (window AC units, unit ventilators (UVs) and rooftop unit (RTUs). Other HVAC system components, including hot and cold water systems (boilers, chillers and cooling towers) should be evaluated on an annual basis to ensure cleanliness of systems, effective operation of components and any need for maintenance and/or repairs.

Commissioning is a process where HVAC engineers evaluate existing systems, compare existing conditions vs original design specifications and benchmark performance of systems in their current configuration. All HVAC systems work should be performed by a licensed and insured contractor with experience in commercial HVAC systems.

Question 2: Does your school's HVAC system meet the basic standards?

"Basic Standards" include the HVAC system and its' components being able to meet ASHRAE 62.1 Standards, which would include two key metrics:

1. Existing systems able to deliver 15 cubic feet per minute (cfm) of fresh, outside air per occupant in each space.
2. Existing systems able to provide 4-6 air changes per hour (ach).

Radiant heating systems do not introduce fresh, outside air and involve no air flow, other than convective currents associated with heat rising. Window AC units also do not introduce any fresh, outside air into the occupied spaces, but only cool and filter air already present in a space.

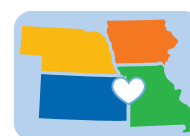
Question 3: How often are the filters changed or how often should they be changed?

Expert guidance from ASHRAE and other sources recommend that filter changes occur on a quarterly basis, or every three months. However, often schools/districts change their filters every four months because it fits with students' schedules. This does not align with ASHRAE recommendations.

Under normal circumstances, experts recommend using pleated, Minimum Efficiency Reporting Value (MERV) 8 to MERV 10 filtration in schools. However, during the COVID-19 pandemic, ASHRAE recommended increasing filtration levels to a MERV 13 filter, if systems allow.

Upgrading to a MERV 13 filter, may increase static pressure on the fan motor. If the system can withstand the resistance of the higher filtration, a MERV 13 filter is recommended.

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Question 4: How does the ventilation and airflow differ within the building – classrooms, hallways, cafeterias and other settings?

This ultimately depends on several key factors (are systems present, what type of system(s) are present, age of system, typical configurations observed, etc.). That being said, there are basic ventilation principles engineers who design buildings use, including:

- Most spaces, including classrooms, should be under positive pressure, relative to the spaces around them (more air delivered into the space from supply vents than is removed from return vents). When the door to the room is opened, air should initially rush or be pushed out from the space.
- Ideally, every space should have fresh air being supplied into the space (via supply vents) and stale, older air being removed from the space (via return vents).
- Any space where contaminants are generated (eg. science labs, restrooms, gas burning appliances, etc.) should be under negative pressure. This means more air is being removed from the space (via return and exhaust vents) than is being delivered into the room (via supply vents). Negative pressure should be create using exhaust ventilation, which removed contaminated air directly to the outside of the facility.

Health and Safety in Schools

Reference

American National Standards Institute and American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. ANSI/ASHRAE Standard 62.1 – 2019 Ventilation for Acceptable Indoor Air Quality [ashrae.org](https://www.ashrae.org) then search Standard 62.1.

Resources



Indoor Air Quality



HVAC Systems



Frequently Asked Questions

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](https://www.cmhc.org/MAPEHSU) at 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.

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