APS Indoor Air Quality and Ventilation Frequently Asked Questions (FAQ)

What mitigation measures has APS put in place to reduce transmission risk in schools?

APS has implemented all mitigation strategies recommended by the Virginia Department of Health and U.S. Centers for Disease Control and Prevention for safe reopening of school. Air quality and ventilation is an important part of a broader health and safety plan that includes:

- Daily health screening including temperature checks
- Strong requirement that all employees and students wear properly fitted masks
- Scheduling and procedural changes to support six-foot distancing and limited mixing of student groups
- Frequent cleaning and disinfecting, handwashing, and hygiene protocols
- Ventilation improvements to ensure all classrooms and facilities meet the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) guidance
- Clear procedures for responding to employee or student illnesses or COVID cases

Masks are the most important layer of defense, according to Dr. Joseph Allen, Director of the Healthy Buildings program and an Associate Professor at Harvard's T. H. Chan School of Public Health (tweet). Maintenance of in-person operations requires consistent adherence to all mitigation strategies by all members of our community.

What steps has APS taken to ensure the indoor air quality and ventilation in schools and classrooms is safe for employees and students to return?

Air quality is an important component of our efforts to reduce the risk of virus transmission in schools. APS partnered with an independent consultant, CMTA, to conduct a comprehensive review of school ventilation systems to ensure facilities are operating in accordance with the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) guidance. This work has been conducted over the course of several months. Steps have included:

1. **Improved the ventilation rate by increasing the circulation of outside air**
   - Maximize outside air ventilation for HVAC equipment to extent possible
   - Open windows in all rooms where windows are available to provide additional outside air
2. **Reviewed the efficiency of classroom ventilation systems and made improvements as necessary**
   - Thoroughly evaluated ventilation equipment, controls, and filter fit
   - Developed a Return to School Classroom Capacity Matrix to identify all classrooms that will be occupied by employees and students for instruction to serve as an initial basis for the air quality assessment and improvements
   - Conducted a careful review of Certified Air Cleaning Devices (CACDs) needed for all classrooms to ensure a minimum of four air changes per hour (ACH) per guidelines
   - Set a target of 4-6 ACH for classrooms based on the recommendation from the Harvard T. H. Chan School of Public Health
3. **Purchased the necessary equipment to supplement ventilation.**
   - Purchased one CACD for every classroom identified in the Return to School Classroom Capacity Matrix, to meet the 4-6 ACH target (1,850 total purchased to date)
   - Purchased two CACDs for any classroom below the minimum 4 ACH target (38 classes will have a second device)

- Installation schedule for CACDs
  - o February 22nd: CACDs installed for Level 1 and Level 2 Phase 1 and Phase 2 classrooms.
  - o March 1st: CACDs installed for Level 2 Phase 3 and Level 3 Phase 1 classrooms.
  - o March 8th: CACDs installed for Level 3 Phase 2 classrooms.

Do all classrooms meet the recommended air changes per hour (4–6 ACH) with one CACD in every classroom as recommended? Will every classroom have one or two new CACD installed and operating before being occupied by staff and students?

Yes, all occupied classrooms will meet the recommended air changes. As of Feb. 24, 98% of classrooms evaluated by CMTA meet the 4–6 ACH with one CACD in the classroom. The classrooms that do not meet this target will be provided a second CACD prior to occupancy by staff and students based on the installation schedule outlined above. See the ventilation reports

What are CMTA's qualifications?

CMTA is a nationally recognized consulting engineering firm and leader in delivering high performance, sustainable and healthy schools. They are the leaders in zero energy design designing the first zero energy school in the United States. CMTA is committed to designing and delivering high performance buildings understanding the importance of optimal learning environments and indoor air quality. CMTA designed APS' first zero energy school, Discovery Elementary and continues to work with APS on other zero energy schools such as Fleet Elementary and the new elementary school at the Reed site.

What is ASHRAE and why does APS follow their guidelines?

ASHRAE is the American Society for Heating, Refrigeration and Air Conditioning Engineers. ASHRAE establishes standards and guidelines for members and industry professionals for the design and maintenance of building environments. ASHRAE 62.1 establishes ventilation guidelines and standards for all commercial buildings including school facilities. APS schools must comply with the Virginia Uniform Statewide Building Code, which follows ASHRAE Standard 62.1 Ventilation for Acceptable Indoor Air Quality.

Why does APS provide information on equivalent outside air using filters rated less than MERV 13?

ASHRAE's most recent epidemic task force released an updated building readiness guide on February 2, 2021, that looked at equivalent outdoor air based on different MERV (minimum efficiency reporting values) filters from MERV 4 through MERV 16 and studies conducted on filter droplet nuclei efficiency.

When APS first asked CMTA to provide a ventilation review and report, the approach was to follow ASHRAE standards and guidelines because they are the basis of our construction codes that apply to our buildings. CMTA evaluated our schools based on these guidelines looking at outside air ventilation and overall ventilation which includes recirculated air. CMTA identified a group of schools that required additional evaluation since their original design had low outside air ventilation.

Why can't APS upgrade all filters to MERV 13?

Regarding MERV 13, ASHRAE states, "Generally, increasing filter efficiency leads to increased pressure drop which can lead to reduced air flow through the HVAC system, more energy use for the fan to compensate for the increased resistance, or both. If a MERV 13 filter cannot be accommodated in the system, then use the highest MERV rating you can."

APS is reviewing what systems can be upgraded to MERV 13 without impacting the equipment's operation or air flow capacity. APS will upgrade to the highest MERV filter possible for our equipment.

What are the Harvard. T.H. Chan School of Public Health recommendations for classrooms?

The Harvard T.H. Chan School of Public Health believes schools can and should open if they follow recommended risk mitigation strategies. They have a Schools for Health: COVID 19 site that shares important information including their 5-Step Guide to Checking Ventilation in the Classroom, a report on risk reduction strategies for reopening schools, and helpful calculators for the classroom.

Dr. Joseph Allen from the Harvard School of Public Health recommends a target of 4–6 ACH for classrooms.

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If air changes per hour (ACH) is the way to go, how is it calculated?

$$\text{ACH} = \frac{\text{OUTSIDE AIR FLOW (cubic feet per minute) x 60 (minutes per hour)}}{\text{ROOM VOLUME (square footage of room x ceiling height)}}$$

How can we rely on APS' calculation of these inputs for effective ACH?

CMTA looked at design outside air flow for classrooms, surveyed our schools to verify ceiling heights, and converted the ASHRAE information in cubic feet per minute (CFM) to ACH. CMTA then used the clean air delivery rate for the CACD with the calculator provided by the Harvard School of Public Health to determine the ACH for the CACD based on a room's volume. The outside air ventilation ACH and the CACD ACH were added to determine if a classroom met the 4–6 ACH target.

How can we verify that APS has the correct data to meet its target for all occupied schools and classrooms?

CMTA has finalized its original ventilation study with the conversion to ACH for outside air ventilation plus the CACD ACH, and this data is posted on the Facilities & Operations webpages.

Under APS' updated ventilation plan, do all classrooms meet the 4–6 ACH with one CACD in every classroom?

As of Feb. 24, 98% of classrooms evaluated by CMTA meet the 4 – 6 ACH with one CACD in the classroom. The remaining classrooms that do not meet this target will be provided a second CACD. See the ventilation reports

Can windows be opened to increase outside air ventilation?

APS encourages staff to open windows if they have them in their classrooms to provide more outside air ventilation.

Why did APS not install UV lights in their HVAC systems?

APS has various types of HVAC systems and equipment. Not all can be retrofitted with UV lights. Some schools have a centralized HVAC system while others have individual units in their classrooms. While recommendations and guidelines continue to evolve during the pandemic, APS feels that the lower cost strategies recommended by the Harvard Public School for Health offers us the best options at this time. These include increasing outside air ventilation where possible, upgrading filters to the highest level, and installing one CACD in every classroom.

What kind of CACDs did APS purchase?

After speaking with several community members regarding certified portable air cleaners and looking at certified portable air cleaners from AHAM (Association of Home Appliance Manufacturer's) and CARB (California Air Resource Board) as well as the Harvard-CU Portable Air Cleaner Calculator, APS purchased BlueAir 211+ CACDs. These units are certified by CARB and AHAM.

What is CARB?

CARB (California Air Resource Board) is charged with protecting the public from the harmful effects of air pollution and developing programs and actions to fight climate change. From requirements for clean cars and fuels to adopting innovative solutions to reduce greenhouse gas emissions, California has pioneered a range of effective approaches that have set the standard for effective air and climate programs for the nation, and the world.

In 2007, CARB adopted a regulation to limit ozone emissions from indoor air cleaning devices. Over 300 manufacturers have submitted test results and obtained CARB certification of their air cleaning devices as required under our regulation. Certification is based on a device's low (usually near-zero) ozone emissions and electrical safety.