

Air Quality & Ventilation at Schools

August 25, 2021



Dr. Mary Ann Dewan

County Superintendent of Schools



Submit your questions through this url:
<https://sccoe.to/AirQualityQs>

Welcome

Dr. Mary Ann Dewan - County Superintendent of Schools

Stephanie Gomez - Santa Clara County Office of Education Chief Business Officer

Ted Pierce - Santa Clara County Office of Education

Roger Silveira - East Side Union High School District

Michael Vallez - Santa Clara County Office of Education



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Goals for Today's Meeting

- Air Quality Index: Defining AQI, resources, and recommendations
- Components of your HVAC systems, ventilation and filtration
- Understanding how outdoor air exchange is critical to maintain and improve indoor air quality
- Addressing poor air quality during COVID-19
- COVID-19 funding sources
- Additional AQI and ventilation resources



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Air Quality Index (AQI):

- Defining AQI
- Resources
- Recommendations



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Defining Air Quality, AQI

- The U.S. EPA developed the Air Quality Index, (AQI), scale to make public health impacts of air pollution concentrations easily understandable
- Translates daily air pollution concentrations into a number scale (0-500) with color-coded ranges
- Identifies specific amounts of pollution in the air, based on federal air quality standards



Air Quality Index (AQI)

Six Categories

AQI Basics for Ozone and Particle Pollution

Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
Green	Good	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	151 to 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201 to 300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.



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Recommended Reliable Resources to Get Air Quality Index (AQI) Information for Your Area



[BAAQMD](https://www.baaqmd.org/)

Sign-up for air quality notifications!



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Recommended Reliable Resources to Get Air Quality Index (AQI) Information for Your Area



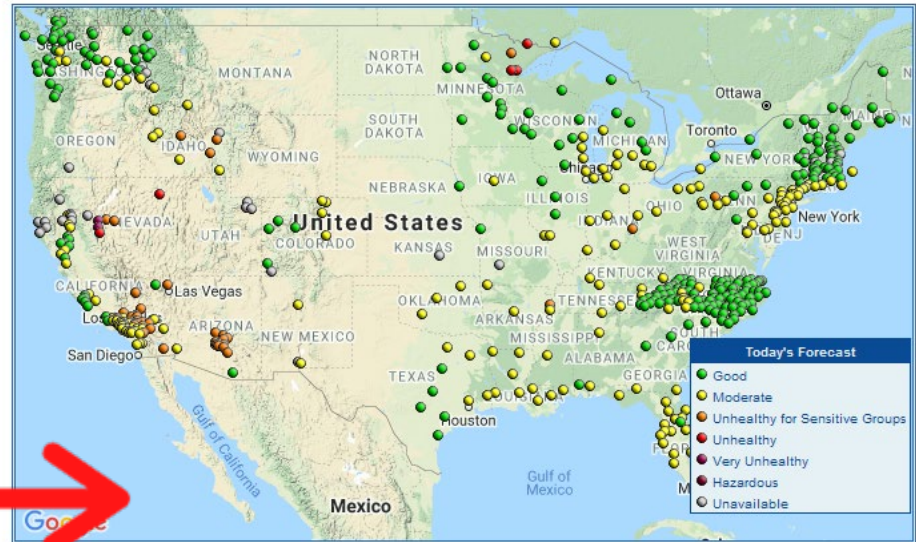
Sign-up for air quality notifications!



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Welcome to EnviroFlash! Air quality affects how you live and breathe. Like the weather, it can change from day to day, or even hour to hour. Up-to-date information allows you to make decisions based on air quality forecasts. EnviroFlash comes to you through a partnership between the US EPA and your state or local air quality agency - notifying you about air quality so you don't have to go searching for it!



School Air Quality

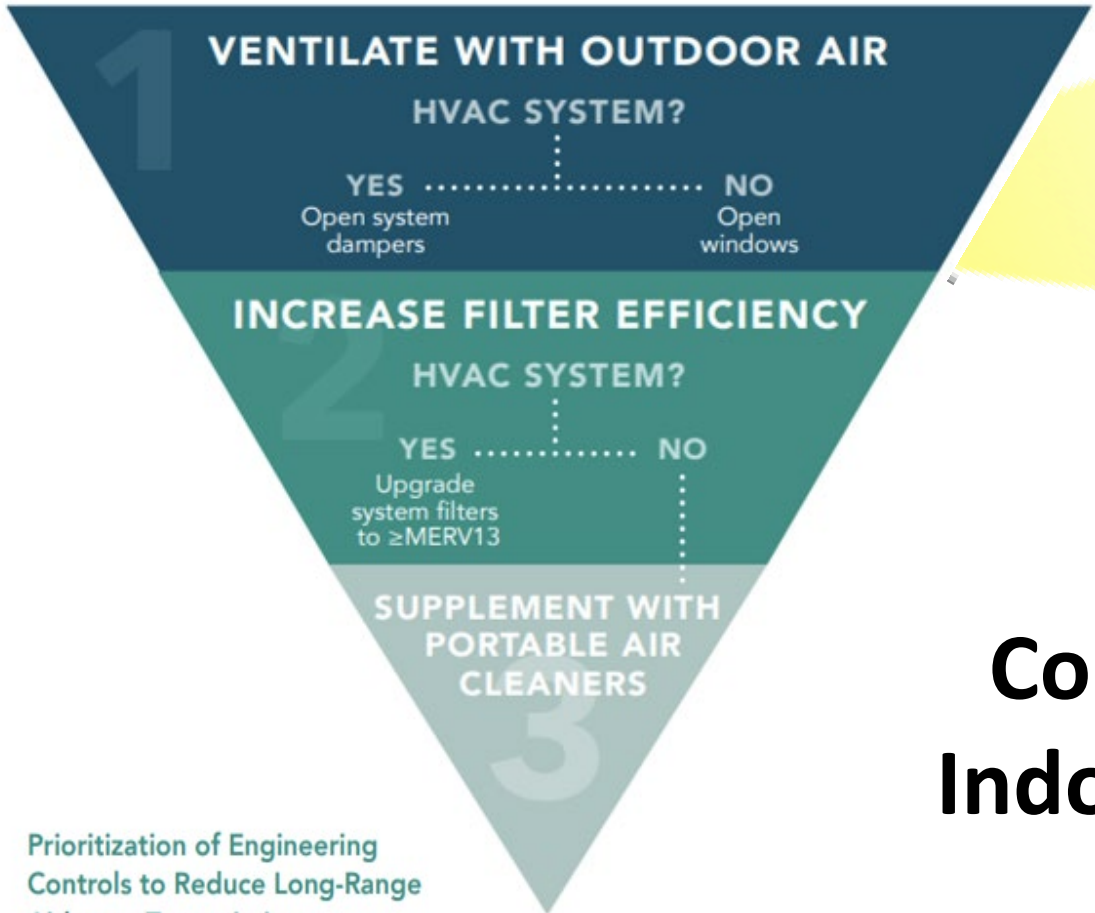
Activity Recommendations (CDE)

The following school activity recommendations are based on consultation with health researchers and several important principles drawn from recent studies.

Modify these levels to correspond with the AQI, emissions concentration, or other air district recommended method for your region.

Air Quality Level

Activity	Level 1	Level 2	Level 3	Level 4	Level 5 <i>School districts may consider school closures based on site-by-site concerns. ***</i>
Recess (15min)	No restrictions	Ensure that sensitive individuals are medically managing their condition.*	Sensitive individuals should exercise indoors or avoid vigorous outdoor activities.*	Exercise indoors or avoid vigorous outdoor activities. Sensitive individuals should remain indoors.*	No outdoor activity. All activities should be moved indoors.
P.E. (1hr)	No restrictions	Ensure that sensitive individuals are medically managing their condition.*	Sensitive individuals should exercise indoors or avoid vigorous outdoor activities.*	Exercise indoors or limit vigorous outdoor activities to a maximum of 15 minutes Sensitive individuals should remain indoors.*	No outdoor activity. All activities should be moved indoors.
Athletic Practice & Training (2-4hrs)	No restrictions	Ensure that sensitive individuals are medically managing their condition.*	Reduce vigorous exercise to 30 minutes per hour of practice time with increased rest breaks and substitutions. Ensure that sensitive individuals are medically managing their condition.*	Exercise indoors or reduce vigorous exercise to 30 minutes of practice time with increased rest breaks and substitutions. Sensitive individuals should remain indoors.*	No outdoor activity. All activities should be moved indoors.
Scheduled Sporting Events	No restrictions	Ensure that sensitive individuals are medically managing their condition.*	Increase rest breaks and substitutions per CIF guidelines for extreme heat.** Ensure that sensitive individuals are medically managing their condition.*	Increase rest breaks and substitutions per CIF guidelines for extreme heat.** Ensure that sensitive individuals are medically managing their condition.*	Event must be rescheduled or relocated.



Prioritization of Engineering Controls to Reduce Long-Range Airborne Transmission

DON'T FORGET YOUR MASK



Components of Indoor Air Quality

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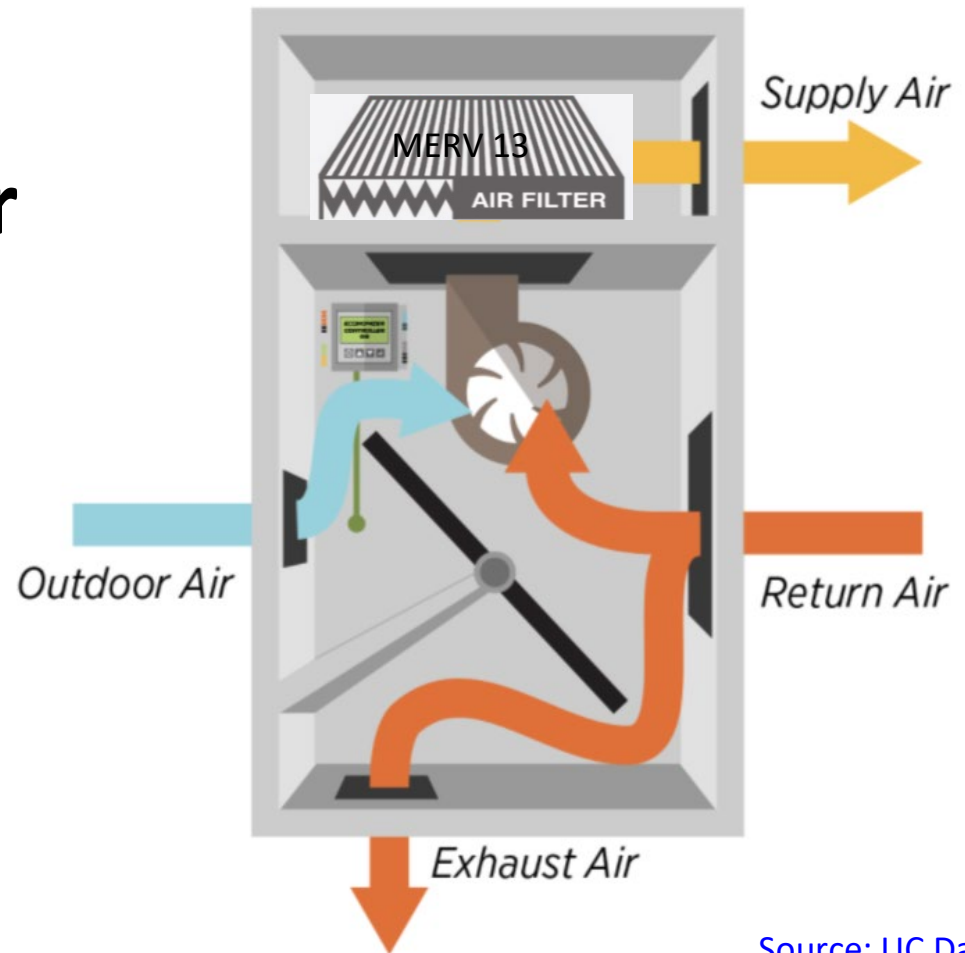


Outdoor Air Exchange is Critical in Increasing Indoor Air Quality



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How Outdoor Air Enters Buildings



Source: [UC Davis](#)



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Outdoor Air Exchange

- Increase outdoor air circulation by opening doors and windows when safe to do so (below 101 AQI).
- If your building has a mechanical ventilation system, evaluate the impact of open windows/doors.
- Typical classroom has 6-8 air exchanges per hour



Recommendations For Your HVAC

- Run air handling systems for longer hours, including before and after the space is occupied.
- Seal edges of the filter to limit bypass.
- Adjust thermostat from 'Auto' to 'On'



Verification of Ventilation & Filtration Performance

- Verify through commissioning and testing.
- Work with an expert to evaluate building systems, ventilation, filtration, and air cleaning.
- Measure carbon dioxide (CO₂) as a proxy for ventilation
- Monitor the effectiveness of the system by measuring ventilation directly, when possible.
 - Building owners/operators can review specific components such as air flow rates (outdoor air vs. recirculated air) and the pressure differences between higher risk areas (e.g., bathrooms and dining areas) and other areas.



CDPH - Ventilation Recommendations

[Airborne Diseases \(ca.gov\)](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/AirborneDiseases.aspx)

- For indoor spaces, ventilation should be optimized
 - Follow [CDPH Guidance on Ventilation of Indoor Environments and Ventilation and Filtration to Reduce Long-Range Airborne Transmission of COVID-19 and Other Respiratory Infections: Considerations for Reopened Schools](#)



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CDPH - Ventilation Recommendations

Practical Implications

Multiple protective strategies can help to substantially reduce the risk of long-range airborne transmission of SARS-CoV-2 in classrooms. These include:

- **Mask wearing**: All individuals (teachers, students, staff, etc.) should wear masks—under all ventilation rate or air filtration conditions in the classroom, this practice reduces both short-range and long-range airborne transmission risk comparing to not wearing mask.
- **Outdoor air ventilation**: The system should provide at least the code-required minimum ventilation rate (per California Title 24). In classrooms with no ventilation and no filtration, the risk of long-range airborne infection would be over six times as high as that for classrooms with code-required ventilation and a MERV 8 filter.



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CDPH - Ventilation Recommendations

Practical Implications (cont.)

- **Filtration**: Ventilation system filters should be MERV-rated at MERV 13 or better. They should also be properly installed (i.e., no gaps that would allow air to bypass the filter) and properly maintained (i.e., replaced as often as recommended). MERV-rated filters can provide substantial protection from long-range airborne infection, especially if ventilation is poor.
- **In-room (portable) air cleaners**: Air cleaners used to reduce the risk of long-range airborne transmission should provide high-efficiency filtration and a sufficient “clean air delivery rate” (CADR) (i.e., at least 2/3 of the floor area). Such air cleaners can provide substantial additional protection, especially in naturally ventilated classrooms (in which air is supplied only through open windows or doors) or in classrooms with non-functioning or poorly functioning ventilation systems. Multiple devices per classroom may be necessary for sufficient total air cleaning.

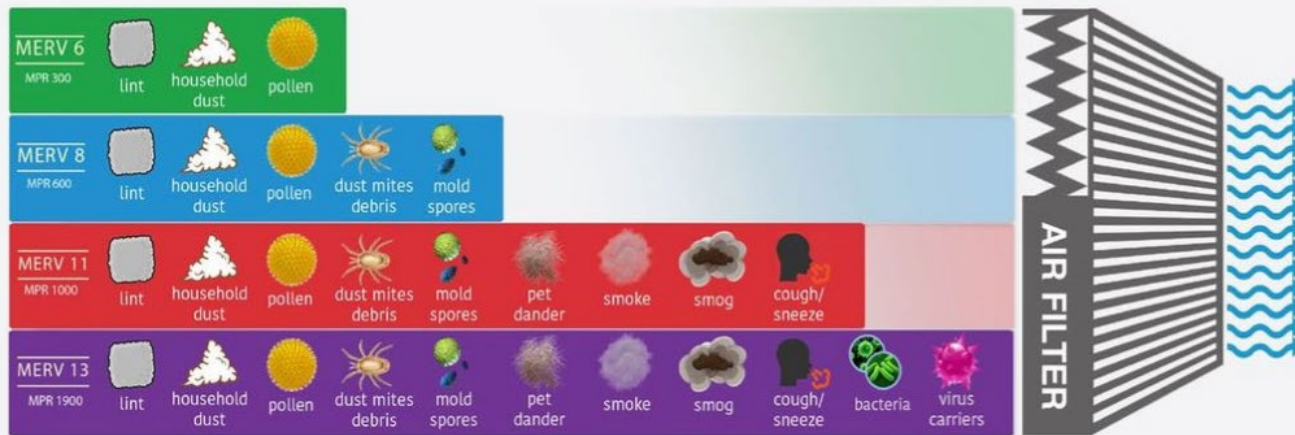


Table 1. MERV Ratings*

MERV Rating	Average Particle Size Efficiency (PSE), microns – % Removal			Typical Controlled Contaminant or Material Sources (ASHRAE 52.2)	Typical Building Applications
	0.3-1.0	1.0-3.0	3.0-10.0		
1-4			<20%	> 10 Microns Textile Fibers Dust Mites, Dust, Pollen	Window AC units Common Residential Minimal Filtration
5			20-35	3.0 to 10.0 Microns Cement Dust, Mold Spores, Dusting Aids	Industrial Workplace Better Residential Commercial
8			>70		
9		<50	>85	1.0 to 3.0 Microns Legionella, Some Auto Emissions, Humidifier Dust	Hospital Laboratories Better Commercial Superior Residential
12		>80	>90		
13	<75	>90	>90	0.3 to 1.0 Microns Bacteria, Droplet Nuclei (sneeze), Most Tobacco Smoke, Insecticide Dust	Superior Commercial Smoking Lounge Hospital Care General Surgery
16	>95	>95	>90		
17**	≥ 99.97			<0.3 Microns (HEPA/ULPA filters) Viruses, Carbon Dust, Fine Combustion Smoke	Clean Rooms Carcinogenic & Radioactive Matls., Orthopedic Surgery
18**	≥ 99.99				
19, 20**	≥ 99.999				

* Adapted from EPA 2009; originally from ANSI/ASHRAE Standard 52.2-2007. Not all levels are shown.

** Not part of the official ASHRAE Standard 52.2 test, but added by ASHRAE for comparison purposes.

MERV 8

vs.

MERV 13



Pressure Drops of Tested Filters

Brand	Depth	MERV	ΔP at 295 ft/min
Nordic Pure	2"	13	0.25
FilterBuy	2"	13	0.13
Flanders	2"	13	0.17
3M	1"	13	0.18
Nordic Pure	1"	13	0.37
FilterBuy	1"	13	0.22
Flanders	1"	13	0.30
3M	1"	7	0.22
Nordic Pure	1"	7	0.23
Flanders	1"	7	0.20

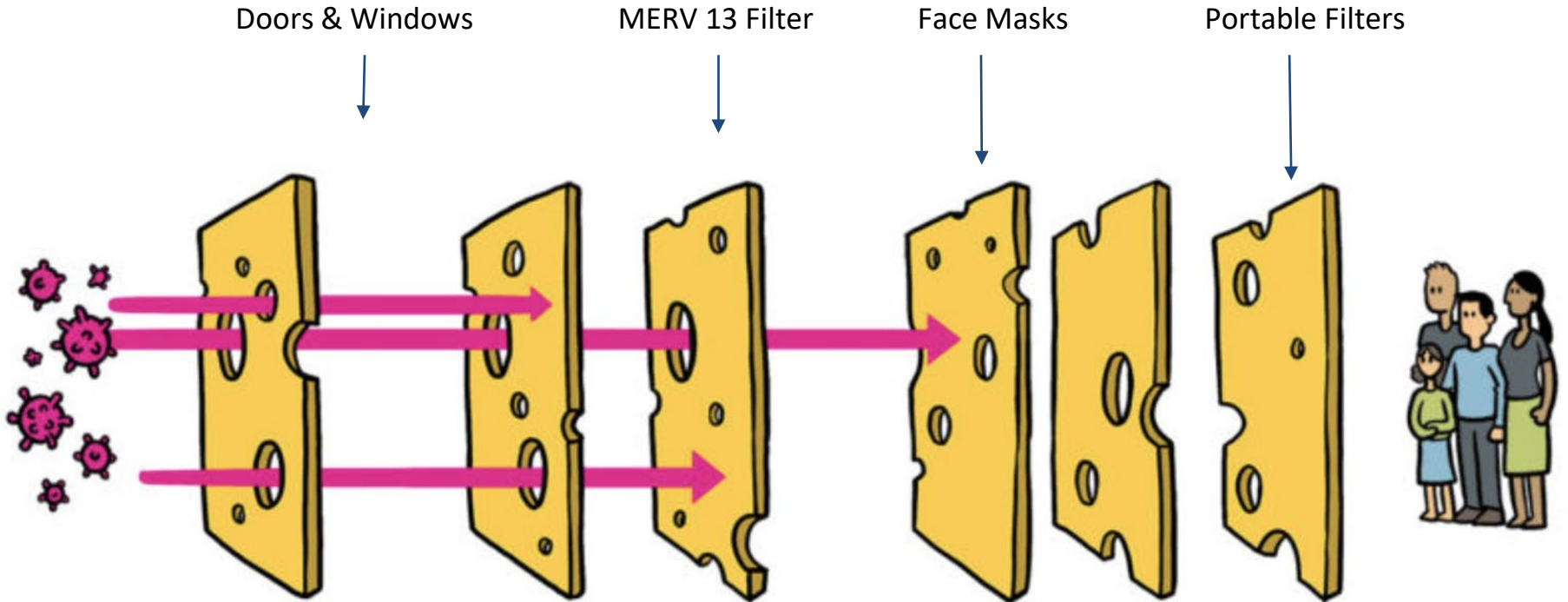
Source: California Energy Commission

**Concerns over
equipment damage
or inability to handle
the MERV 13 filters**



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Swiss Cheese Approach



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Wear a Face Covering



- The best protection is a N95 or KN95 respirator which requires a professional fitting and training.
- A surgical and/or cloth mask provides an additional 15% to 30% particles blocked.
- Double Masking* - wearing a cloth mask atop a disposable surgical mask

* CDC correlated different types of masks with efficiencies in blocking particles small enough to be considered “most important for transmitting SARS-CoV-2.”

- **42 percent of particles blocked:** Unknotted surgical mask
- **44.3-percent of particles blocked:** Cloth face mask
- **92.5-percent of particles blocked:** Double mask



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Portable Air Cleaners

- Commonly called HEPA filters
- Consider using these filters where there is **no or poor outdoor ventilation, no HVAC system, or when upgrades to the HVAC system are not feasible**
- Recommended to purchase units which are **certified for ozone emissions and electrical safety** by the California Air Resources Board (CARB)
- **Avoid ozone-producing air cleaners**



Addressing Poor Air Quality During COVID-19

- Continue to wear a mask / face cover
- Monitor AQI
 - Sign up for AQI notifications
 - Have a plan when AQI becomes unsafe
 - Close doors and windows when AQI is unsafe
- HVAC Systems
 - Ensure HVAC systems are functioning properly
 - Install MERV 13 or better
- Provide portable air filters for areas with poor ventilation



COVID-19 Funding Sources

- In-Person Instruction Grant
- ESSER Funds (I, II, III)
- Allowable Uses:
 - Inspection, testing, maintenance, repair, replacement and school site upgrades to improve indoor air quality and ventilation in school facilities
 - Capital projects over \$5,000 require preapproval from CDE:
 - <https://www.cde.ca.gov/fg/cr/documents/fedfundscapitalexpl.pdf>



Examples of Allowable Uses

- Portable air cleaners and air cleaner filters
- HVAC system maintenance, repairs, upgrades or replacement
- MERV 13 filters
- HVAC system air quality inspection or testing
- Replacing windows for increased air quality
- Replacing or fixing roof for air quality



Additional AQI & Ventilation Resources

- Video: UC Davis (Western Cooling Efficiency Center)
 - *“The Importance of Filtration in Schools” (8:12)*
 - https://youtu.be/ycgLBUfIM_c
- Video: UC Davis (Western Cooling Efficiency Center)
 - *“Ventilation in Schools” (6:31)*
 - <https://youtu.be/F9hB9BgonHs>



Additional AQI & Ventilation Resources

- Air Quality Template for Schools - California Dept. of Ed.
 - [School Air Quality Activity Recommendations - Air Quality \(CA Dept of Education\)](#)
- EPA Tools for Schools
 - [Indoor Air Quality Design Tools for Schools | US EPA](#)
- MERV 13 Installation
 - [https://www.youtube.com/watch?v=ZO-LE5_pJbw](#)



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Additional AQI & Ventilation Resources

- Santa Clara County Office of Education - Advisory Page
 - <https://www.sccoe.org/resources/emergencyadvisory/Pages/default.aspx>



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CURRENT ADVISORIES AND UPDATES

Air Quality Index (AQI) Resources



- Air Quality - School Disaster and Emergency Management (CA Dept of Education): California Department of Education Air Quality Index info & resources
- Air Quality Index (AQI) Info
 - AirNow.gov: Current Air Quality Data and Fire & Smoke Map
 - Bay Area Air Quality Management District
- Spare the Air

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Q&A



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