# Bringing Schools and Universities Back to Life

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The American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Epidemic Task Force has recently updated guidance for schools and universities in efforts to help protect the health, safety and welfare of the world's students and staff from the spread of SARS-Cov-2 (the virus that causes COVID-19 disease), deeming this essential to protecting the population. ASHRAE's position is that "*Transmission of SARS-CoV-2 through the air is sufficiently likely that airborne exposure to the virus should be controlled. Changes to building operations, including the operation of heating, ventilating, and air-conditioning [HVAC] systems, can reduce airborne exposures.*"

Their guidance has been formulated to help designers retrofit and plan for the improvement of indoor air quality and to slow the transmission of viruses via the HVAC systems (please refer to the ASHRAE guideline for complete details). In addition to many others, a few of the specific HVAC measures being recommended by ASHRAE include:

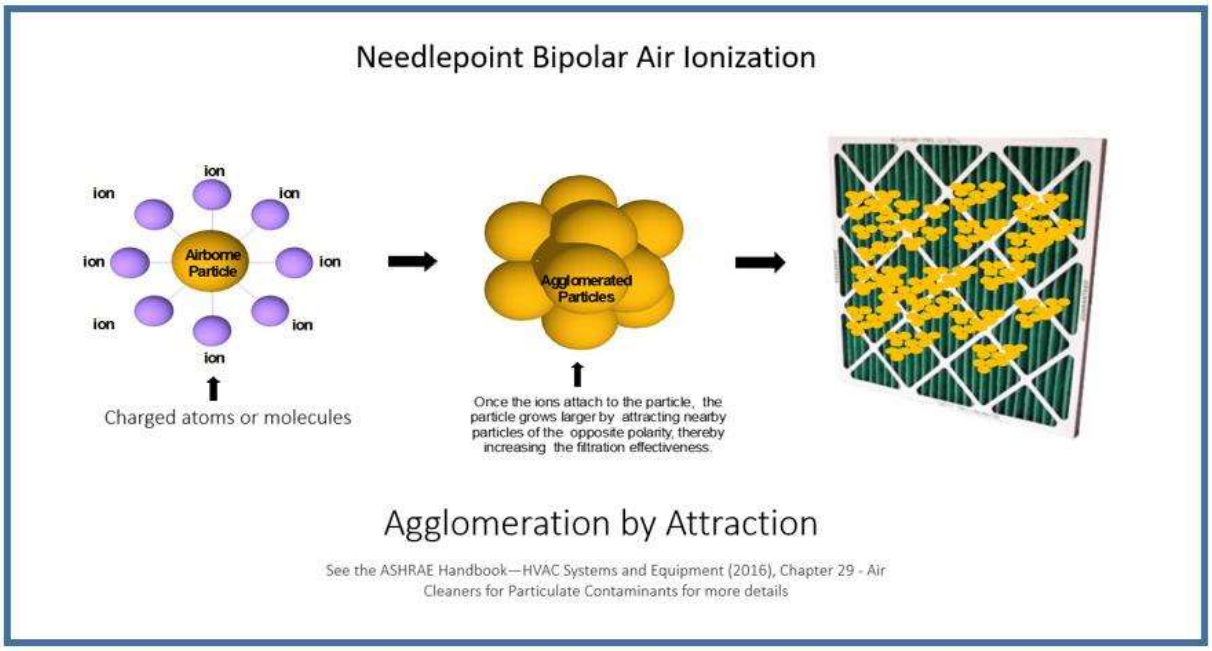

1. To increase outdoor ventilation rates if the HVAC system can handle it.
2. To apply the highest air-filter Minimum Efficiency Reporting Value (MERV) applicable for the HVAC unit. HEPA or MERV 13 is the recommended minimum if the equipment can accommodate the additional pressure drop, and MERV 14 is preferred. The target level for filtration in schools is MERV 13 or higher. This minimum target will on average remove at least 75% of the particles with a size range of 0.3-1.0 µm.
3. If MERV 13 Filters cannot be installed consider the following; air **Ionization systems** or static charge on filters.
4. Consider UV treatment but review location to avoid impacts of liners and other internal components. Ensure no UV lights shall shine on filters.
5. Introduce portable, all electric HEPA/UV machines in each classroom.
6. Install humidifiers in AHUs and packaged rooftop units if possible.
7. Install duct mounted humidifiers at classrooms as an alternative.

Many existing HVAC systems may not be capable of upgrading filtration to higher MERV ratings for a variety of reasons. The more efficient filters may not fit the existing filter rack, or they may impose additional airflow pressure drop which hinders proper fan performance while consuming excess energy. It may also be impossible to procure higher efficiency filters in a reasonable timeframe, with current national lead-times for MERV-13 filters running from 24-36 weeks based on increased demand due to the COVID-19 pandemic. In these cases, an alternative recommended in the guidance document is to implement **needlepoint bipolar ionization** to improve the efficacy of existing ventilation and filtration systems.

Much of the fine particulate existing within the indoor air is too small in size or light in weight to be removed from the occupied space by the influence of air-motion alone; it therefore can remain suspended in the air indefinitely. It may include viral material and other pathogens as part of these airborne particles, which then act as a transport mechanism for respiratory infection between individuals breathing this air. Traditional HVAC ventilation and filtration strategies may have little impact on cleaning the indoor environment as these small particles of concern cannot be moved out of the space and into the HVAC system to be exhausted, filtered, or treated.

If the particles and gasses in the space are removed, they are no longer of concern. NPBI is capable of helping improve traditional ventilation and filtration by influencing the removal of small airborne particulate from the environment based on the principle of electrostatic attraction (agglomeration). Ions, like those already prevalent in cleaner outdoor air, are artificially generated within the HVAC system so that when released and distributed throughout the building, they mix with room air and attach (electrostatically) to airborne particles. As these charged particles are increasingly attracted and joined to one another, their size and weight is increased to the point where they are now large and heavy enough to be moved with the HVAC system's air movement. They can now be effectively removed from the space and exhausted, filtered, or treated. Air filters now become more efficient at removing these larger particles from the air, while internally mounted HVAC air purification

devices can actually come in contact with the pollutants they have been tasked with cleaning, those which before had always remained in the space.




NPBI has been successfully used in cleanroom applications to help reduce airborne particle counts and create the cleanest indoor environments possible for critical healthcare, pharmaceutical, food processing, and manufacturing processes. A large number of studies have demonstrated that air ionization is efficient at removing aerosols and particles from the environment, proving significant reductions in particulate concentrations. The HVAC system fan and NPBI device should be left on continuously to recirculate space air in order to produce the best results.

In addition to NPBI helping rid indoor environments of particulate, it can provide additional IAQ benefits by inactivating viruses, breaking down volatile organic compounds (VOC's), remediating odors, and killing living pathogens. Applied upstream of wet cooling coils, it eliminates issues with biofilm and microbial growth in HVAC air-handing systems.

Note: ASHRAE states that *"All retrofits and modifications must not contradict ASHRAE 62.1 guidelines and must continue to meet code".* ASHRAE 62.1 specifically states that (electrically powered) air-cleaning devices that generate ozone are prohibited, and all air cleaning devices shall be listed and labeled in accordance with

UL2998 (for zero ozone emission). This is a very important consideration when making decisions on air cleaning technologies serving sensitive indoor environments, particularly when students and staff are concerned.

## References:


1. ASHRAE Epidemic Task Force; Guidance for Schools and Universities (7-17-2020).
2. ASHRAE Position on Infectious Aerosols.
3. ASHRAE Position Document on Airborne Infectious Diseases.
4. ASHRAE Position Document on Filtration and Air Cleaning.
5. David N. Schurk, Whitepaper; What's Next for HVAC.
6. David N. Schurk, Whitepaper; The ABCs of NPBI.
7. David N. Schurk, Whitepaper; Can HVAC Filters "Catch" the SARS-CoV-2 virus?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