

EMCOR Services Mesa Energy Systems

HVAC System Recommendations

FOR 2020 AND BEYOND

At **EMCOR Services Mesa Energy Systems**, our mechanical systems experts have put together a series of recommendations to help building owners and operators improve indoor air quality (IAQ) and eliminate airborne pathogens that can carry viruses.

Research from ASHRAE has shown the tremendous affect that HVAC systems can have on reducing the spread of COVID-19 by minimizing concentrations of airborne pathogens.



Addressing Infections

What to do with a mechanical system if occupants are infected

Before we begin making mechanical system recommendations, we want to address one of the most pressing concerns for many building owners and operators. What should you do with your HVAC system if a regular building occupant tests positive for COVID-19?

If an employee, frequent visitor, or someone working on mechanical equipment becomes infected, there are some steps that can be taken to ensure that mechanical equipment is not transmitting the virus any further. Luckily, these precautions can often be taken without entirely shutting down an HVAC system. In terms of your HVAC system, the focus should be exclusively on its impact to airborne spread, as it will have virtually no effect on surface contamination.

With this in mind, the first step after a confirmed infection is to have the system sterilized by a professional contractor who can also ensure that the system has adequate filtration and clean filters. For extra precaution, consider sanitizing air handling units, and this is also an ideal opportunity to perform an HVAC retrofit that incorporates cleaning technologies – such as needlepoint bipolar ionization.

While the survivability of the virus on different surfaces is still being studied, filters that are removed should be immediately bagged and sealed. To help ensure technician safety, special handling may be required by persons trained to perform this work. There is no point in going through the sterilization process only to spread the infection out of a lack of due diligence!



Getting Started

Cleanliness, maintenance, and operational best practices

Routine maintenance and cleaning forms the foundation of any HVAC program aimed at promoting occupant health and comfort.

A regular maintenance, cleaning, and filter replacement schedule can make a major improvement on IAQ and should be established before considering any major changes to mechanical systems, filters, or other mitigation technology. In fact, one of the best measures to take in this moment is increasing the frequency of maintenance checks and filter replacements.

If you are transitioning to regular operations after a period of low- or no-occupancy, you might consider a retro-commissioning process to test equipment and perform repairs, in an effort to promote optimal system function. This is also an ideal time to perform an IAQ analysis to assess the unique demands of your environment.

Must-Do Best Practices:

1. Change filters regularly, as recommended by your system's unique operating requirements.
2. Check that equipment regarding outdoor/ventilation air is working properly and, if possible, follow a retro-commissioning process to confirm system performance.
3. Utilize an EPA-approved disinfectant to disinfect air handling equipment's indoor coils.



Outdoor Air Circulation and Ventilation

After setting a diligent maintenance and cleaning routine, the next logical step is to make ventilation adjustments that maximize the displacement of contaminated indoor air with outside air. **Improving ventilation and outdoor air circulation is essential for ensuring your building's HVAC system is setup to minimize the transmission of airborne viruses and pathogens.**

Improving ventilation and increasing intake levels helps eliminate the re-circulation of pathogens and can result in significantly cleaner air.

Ventilation Tips:

1. Increase IAQ by increasing outdoor/ventilation air.
2. Inspect outdoor air dampers/economizers (and return or relief air components) for function and to ensure they are properly set.
3. Consult a trusted mechanical contractor before making changes, especially for buildings with controlled pressurization levels, such as laboratories, healthcare, and pharmaceutical environments.
4. Follow other IAQ best practices, such as regularly scheduling flush outs and leveraging building controls.

Remember:

Ventilation is Application Specific

Changes to outside air intake should always be application specific and made according to the unique requirements of a building's space and system. However, for any mixed-air HVAC system attempting to maximize IAQ, increasing outside air ventilation should always be prioritized above considerations around energy conservation and efficiency.

Consulting a professional mechanical contractor is the best way to balance your operational needs with a desire to improve ventilation.

Adjusting for Relative Humidity

It's crucial to keep relative humidity top of mind when making adjustments to ventilation and circulation. While increasing outdoor air circulation typically helps improve IAQ, an ASHRAE report on infectious disease has shown that when relative humidity levels are low it can result in microbes and pathogens staying airborne longer.

Whenever you can, make sure that your building's HVAC system can maintain relative humidity between 25% and 60% RH. And, most importantly, make sure to keep any humidification systems properly maintained and operational.

Maximizing Filtration

Choosing Filters that Fit Your System

When done correctly— according to the needs of your system—upgrading HVAC system filtration can significantly improve IAQ and promote occupant health and comfort. According to the National Air Filtration Association, filters below MERV 15 have limits on their ability to trap virus microbes, and, often enough, the filters that are located upstream of your coils typically do not have more than a MERV 13 rating.

Bring in a professional mechanical contractor to review your system and determine the highest MERV-rated filter that is compatible with your equipment and facility. Professional technicians can also confirm the effectiveness of any existing high-efficiency MERV or HEPA filters and ensure that they are well sealed within their frames.

What to Consider Before a Filter Upgrade

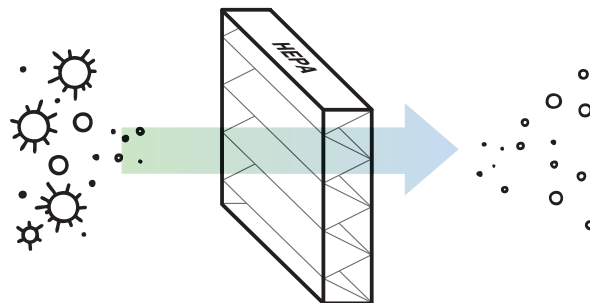
Additionally, always remember that each HVAC system and building is unique. Even though increasing MERV rating is typically a smart move, you and your mechanical contractor should also take the factors below into account before upgrading filtration. Regardless of a filter's rating, its effectiveness and efficiency can vary significantly depending on the system of which it is a part.

When MERV rating is increased too much—without also increasing filter surface area—your system may suffer from decreased airflow and require a fan speed adjustment. There are practical limitations for most commercial equipment and, at times, they face excessive filter loading. As discussed above, airflow is fundamental to IAQ, and, as a result, boosting filtration at the expense of outdoor air circulation can actually end up negatively impacting occupant health.

Typically, commercial systems can tolerate an upgrade to MERV 11 without changing fan-speed. However, if you feel that any level of filtration above MERV 13 is required, it is essential that you consult an HVAC professional who can assess your system and building needs and make any necessary adjustments to ventilation and fan speed.

HEPA Filtration: A Solution for Critical Environments

In a similar vein, some critical environments—such as hospitals, healthcare facilities, etc.—require a level of filtration that goes above and beyond the norm. For these facilities, HEPA filters are often the right solution. HEPA filters offer outstanding filtration but should only be used with equipment with the necessary fan power, filter rack construction, and ventilation needed for the job. Again, consult an expert when considering any filter upgrade.



No matter the circumstance, the performance of even the highest rated filter will deteriorate over time, so make sure filter replacements are regularly scheduled.



Incorporating Technology

A Balanced Approach

SARS-CoV-2, the virus that causes COVID-19, is still new, and, as a result, information regarding survivability in air and on surfaces is still being updated regularly as new research comes to light. For this reason, it is important to utilize multiple techniques and technologies to help maximize your protection from the virus.

No single strategy can guarantee that viruses and pathogens will be 100-percent eliminated, but a balanced approach can go a long way in improving IAQ and promoting occupant health.

Along with increased standard maintenance, proof of performance, circulation, and filtration improvements, there are a number of additional air cleaning technologies we recommend to clients depending on their unique facility and system requirements.

Needlepoint Bipolar Ionization

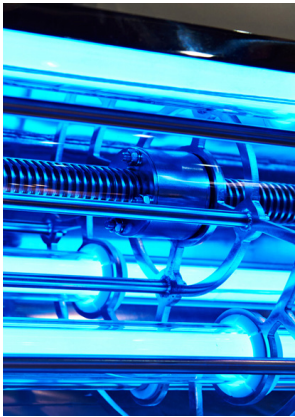
Because of the advances in this technology, the effectiveness in which it treats the occupied space, and the low cost of ownership, needlepoint bipolar ionization (NPBI) is our recommended solution—over any other technology, including ultraviolet irradiation—for odor, bacteria, mold, volatile organic compounds, and pathogen control.

Air ionization has increasingly gained in popularity as an active air treatment option, especially with recent developments in the last decade that have helped it overcome issues with ozone. The patented NPBI solution that we recommend utilizes an electronic charge to create ions that destroy contaminants and accumulate micro-particles into larger filterable particles.

Benefits of Our NPBI Solution:

- Even after passing through the HVAC system, ions continue to act on air particles throughout a facility.
- This product includes independent lab results for making SARS-CoV-2 99%+ non-viable within 30 minutes.
- This product also has no consumable parts compared with other ionization products that have tubes or cartridges.

Additional IAQ Technologies



Another common technology leveraged to improve IAQ is ultraviolet C (UV-C) irradiation. Placed on the backside of cooling coils or in ductwork, UV-C bulbs offer continuous 24/7 protection from the buildup of pathogens

on HVAC equipment. Typically, the lifespan of a UV bulb is one year, and the efficiency of a bulb can be up to 50-percent less after one year in use. Always consult your HVAC contractor to verify performance and ensure bulbs are included in any routine maintenance schedule.

Independent filtration equipment is sometimes a useful tool for buildings with heavily populated areas. There are a variety of independent cleaning devices on the market, including upper air UV-C fixtures, small HEPA filter recirculating/portable air systems, and larger cleaning systems. These machines offer targeted filtration for buildings with heavily populated areas—such as waiting rooms, small patient rooms, lobbies in commercial buildings, conference rooms, convention centers, etc. They help minimize the spread of viruses and bacteria that haven't passed through filters in a building's central HVAC system.



The above recommendations establish a solid foundation for any building owners and operators serious about improving their indoor air quality and doing their part to fight the spread of COVID-19. In collaboration with your trusted HVAC provider, you can implement these best-practices and technologies to help ensure your mechanical system is prepared for the current crisis and what lays beyond.

This document was developed for general guidance and a list of considerations for those who operate and maintain commercial HVAC systems. Information is not intended to specify solutions as these would be application specific and would require the design guidance of a qualified HVAC professional.



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