

## HVAC/Negative Pressure

### Q: Is duct cleaning required to be able to recover COVID care spaces to non-COVID care spaces?

There is significant confusion regarding just what needs to be done regarding cleaning of ventilation systems that have been used to service COVID-19 patient care areas. This issue is actually much larger than just the cleaning of the system. For many reasons, one of the most valid being that the SARS-CoV-2 is a virus that cannot grow or replicate without a specific host, ASHE does not recommend that duct work be cleaned and that filters only be replaced if needed based on facility policy and procedures. In the [ASHE Recovery Short Term Needs guidance](#) the following is additionally recommended:

Patient care spaces require careful consideration to ensure patient and staff safety. It is important to examine changing facility needs with the assistance of qualified facilities professionals that can assess the facilities engineering controls and patient flow and help verify that response efforts will properly protect patients, staff and visitors. We strongly recommend using a multidisciplinary approach, with professionals including but not limited to:

- Facility Manager
- Infection Preventionist
- Safety/Security Manager
- Environmental Services
- Risk Manager
- Clinical Staff

As COVID care spaces are demobilized, consider the following recommended ventilation system steps to return the space to non-COVID Care (NCC) patient care areas:

- Verify that all airflow relationships are correct and brought back minimally to the original design flow. If large areas are to be rebalanced, consider applying the appropriate ASHRAE/ASHE 170 standards. Ensure you have the appropriate engineering assistance to achieve this redesign.
- Verify that all pressure relationships for pressure related rooms are appropriate (e.g., soiled utility rooms are negative and clean supply rooms positive).
- Examine filtration media in air handler units to verify that mitigation efforts did not cause negative impacts and change filters as necessary.
- Verify that CDC recommended guidelines (see CDC Table B.1) for air changes and time required for contaminate removal based on air changes is followed.
- Verify that terminal cleaning is completed in clinical spaces and patient rooms following hospital or facility policies.

### Q: Is negative pressure required for COVID-19 patient treatment?

A: No – the CDC recommendation is to place COVID-19 positive patients in a single patient room and keep the door closed. Additionally, the CDC recommends to:

- Limit transport and movement of the patient outside of the room to medically essential purposes.
- House patients in the same room for the duration of their stay.
- Whenever possible, perform procedures/tests in the patient's room.
- Reserve Airborne Infection Isolation Rooms (AIIRs) for patients who will be undergoing aerosol-generating procedures.

## **Q: Can the SARS-CoV-2 virus become airborne?**

A: [Studies](#) indicate that aerosol propagation of the virus is possible in the case of prolonged exposure to high concentrations of the aerosols in a relatively closed environment.

## **Q: What benefit does negative pressure offer for housing COVID-19 positive patients?**

A: With the CDC guidance to house patients in the same room for the duration of their stay, limit transport and movement, and perform procedures/tests in the patient's room, the risk of aerosol propagation of the SARS-CoV-2 virus within the patient room increases. Negative pressure rooms will help mitigate the transmission of the aerosolized virus to other spaces by assuring the flow of air from clean to less clean spaces in the facility, helping to protect health care providers.

## **Q: Should negative pressure be used in spaces that require positive pressure relationships (such as ORs, procedure rooms, etc.) when a COVID-19 patient needs to be treated in such spaces?**

A: No. This should be addressed the same as with a TB patient in the OR. Basic recommendations are:

- Only medically necessary procedures should be scheduled "after hours."
- Minimize staff, and all staff involved to wear N95 or HEPA respirators.
- Door to room should be kept closed throughout the procedure.
- Recovery should be accomplished in an AIIR room.
- Terminal Cleaning should be performed after sufficient number of air changes has removed potentially infectious particles.

## **Q: What is the best way to create negative pressure in a patient room?**

A: This will significantly depend on the design of the patient room and the ventilation system serving the patient room. The ASHE COVID-19 webpage offers different [negative pressure room concepts](#). Some general considerations for the room are:

- The room should be a single patient room with a dedicated bathroom.
- The return air grill within the patient room should be sealed off from the ventilation system.
- The door to the patient room should be maintained closed as much as possible.
- Negative pressure should be verified prior to placing the room in service and should be monitored and maintained while the room is in service.

- Limit transport and movement of the patient outside of the room to medically essential purposes.
- Patients should be housed in the same room for the duration of their stay.
- Whenever possible, perform procedures/tests in the patient's room.
- Terminal Cleaning should be performed after sufficient number of air changes has removed potentially infectious particles.

## **Q: Are there requirements that must be met for a negative pressure room?**

A: No. Since a negative pressure patient room is not a normally recognized health care space there are not established requirements. The ultimate goal is to achieve and maintain a negative pressure relationship to adjoining spaces to be able to move air from clean to less clean spaces.

## **Life Safety/Staff Safety**

## **Q: My organization is considering doing employee self-screening. What guidance is there regarding this?**

Per the CDC guidance, screening employees is an optional strategy for employers. Performing screening or health checks will not be completely effective because asymptomatic individuals or individuals with mild nonspecific symptoms may not realize they are infected and may pass through screening. Screening and health checks are not a replacement for other protective measures such as social distancing.

Consider encouraging individuals planning to enter the workplace to self-screen prior to coming on-site and not to attempt to enter the workplace if any of the following are present:

- [Symptoms of COVID-19](#).
- Fever equal to or higher than 100.4 F\*.
- Under evaluation for COVID-19 (for example, waiting for the results of a viral test to confirm infection).
- Diagnosed with COVID-19 and not yet cleared to discontinue isolation.

\*A lower temperature threshold (e.g., 100.0 F) may be used, especially in health care settings.

## **Q: Can I use telethermographic systems as my screening process for COVID-19?**

The FDA provided guidance for the use of telethermographic systems during the coronavirus. The FDA states, "The available scientific literature supports the use of telethermographic systems in the context of initial human temperature measurement during such a triage process." When using these devices keep in mind the drift and accuracy of individual devices, especially when measuring moving subjects. It is recommended that chosen devices be evaluated to verify for drift and accuracy before implementing usage for screening purposes.

The [CDC](#) recommends screening patients and staff before they enter the facility. Screening helps:

- Reduce exposures for other patients and healthcare personnel

- Prevents the spread of disease within the facility
- Ensures personal protective equipment (PPE) is used effectively

A multidisciplinary team should develop the screening process for patients and staff to ensure that all safety measures are implemented to protect public health. The CDC also recommends that patients are sent to the appropriate waiting areas, which should be organized to divide patients with symptoms from patients without symptoms. Patients should also be separated at least 6 feet, and the area for patients with symptoms should be at least 6 feet away from the area for patients without symptoms.

## **Q: At what point should clinical care requirements supersede the life safety requirements that are normally enforced?**

A: During an emergency, responding organizations are faced with complex, unpredictable events which could impact patient care and pose the risk of catastrophic losses. Traditional command and control structures of decision-making may need to be revised to accommodate greater flexibility and creativity by response teams. Timely evaluation and decision-making is vital and improvisation becomes a necessary tool to determine the most appropriate response. Yet, during an emergency response it is important to remember that risk assessments can be a great tool to assist in the decision-making process. The use of risk assessments coupled with current information and team communication can help determine the best plan of action.

## **Q: What do I need to consider regarding increasing environmental temperatures for temporary sites for COVID-19?**

A: There are not any specific standards that cover working in hot environments. Nonetheless, under the Occupational Safety and Health Act, employers have a duty to protect workers from recognized serious hazards in the workplace, including heat-related hazards. There are several areas of concern when it comes to protecting staff from heat-related illnesses. The Occupational Safety and Health Administration (OSHA) provides significant resources in relation to this issue including a [heat index guide](#) developed by the National Oceanic and Atmospheric Administration (NOAA). Some things to consider are the construction and use of the structure, the exterior temperature, the relative humidity level, the amount of personal protective equipment (PPE) required to be worn and the number of staff within the space.

Regarding structure type and use of temporary facilities for COVID-19 care, there are three main areas to be considered:

- Alternate care sites (ACS) for patient care and/or monitoring
- Testing sites within temporary structures or tents
- Work sites that are outside with limited coverage

ACS for patient care and/or monitoring: These sites should be designed and established to meet the basic requirements of patient care areas and should have a ventilation system that provides heating and air-conditioning to maintain appropriate temperatures and humidity within the structure. While it may not be possible to meet all of the requirements listed in ASHRAE/ASHE Standard 170, Ventilation of Health Care Facilities, it would be expected that temperature would be able to be

maintained within the recommended ranges provided within this standard, which is generally 70-75 F (21-24 C).

Testing sites within temporary structures or tents: While most of these structures come equipped with fans or other devices to provide cooling, it may be necessary to coordinate with the rental company for additional or alternate cooling devices, such as spot coolers or misters, when exterior temperatures rise into the mid- to high 80s. When doing this, also consider the utility sources for these devices. The NAOO heat index guide provides guidance on what temperature and relative humidity combinations can cause increased risks for heat-related illnesses. It is recommended that, when possible, the temperature within these structures should be maintained within the same range as ACSs – generally 70-75 F (21-24 C).

Work sites that are outside with limited coverage: When working outdoors there are two main considerations. First, the environmental conditions obviously have a major impact; but second, the amount of internal heat generated by the worker's physical labor and the amount of PPE that is required must also be considered. OSHA has four risk levels based on the heat index and provides detailed guidance for protective measures to be taken at each level on the [heat index protective measure](#) webpage.

A final consideration for any of these areas is the impact that the cooling devices could have on the spreading of the SARS-CoV-2 virus. Strongly consider including the infection preventionist in the discussions of cooling these areas to assure that appropriate measures are taken to avoid negative impacts within this area of concern.

## **Construction**

### **Q: Should all contractors and service providers be restricted from working within the facility?**

A: During an emergency, it is prudent to restrict access to the facility. Restricting contractors is definitely something that should be considered at this time. However, with the potential duration of this emergent situation and possibility that facility changes may need to be made rapidly, facilities should examine individual access levels for each contractor/service provider based on their specific work and the facility areas needed to access the work.

### **Q: Are there any enhanced COVID-19 safety recommendations for contractors?**

A: Recommendations would be specific to the project or work being provided, but consider restricting contractor access into COVID-19 units, developing a specific check-in/out procedure and identifying what personal protective equipment will be necessary.

### **Q: What should contractors working in SNFs expect? Are there any additional measures contractors should take?**

A: During this situation, contractors should expect circumstances to be dynamic, possibly changing on a daily basis, and that ultimately it may be necessary to suspend all construction activities unrelated to the emergency response. Communicating and working with the project manager and contracting officer at the facility will be essential to assuring that that proper contract procedures are followed and contractor employees are properly protected.

## **Q: In order to "do no harm," should construction projects be suspended during this crisis?**

A: Suspending construction projects should be considered on a project-by-project basis. Consideration should not be limited to the protection of the patients and should include what is needed to protect those working on the project.

## **Disinfection**

### **Q: How should an infected area be cleaned and disinfected?**

A: Normal protocols for daily and discharge cleaning of isolation rooms prevails (airborne or droplet and appropriate PPE) using an [EPA List N disinfectant](#), adhering to the dwell time. Where visibly and heavily soiled, clean with a detergent solution before disinfecting.

In general, only essential personnel should enter the room of patients with COVID-19. Health care facilities should consider assigning daily cleaning and disinfection of high-touch surfaces to personnel who will already be in the room. Personnel should wear all recommended PPE when in the room. PPE should be removed upon leaving the room, immediately followed by performance of hand hygiene.

After patient discharge, terminal cleaning should be performed. Personnel should delay entry into the room until a sufficient time has elapsed for enough air changes to remove potentially infectious particles per [CDC Table B.1](#). After this time has elapsed, personnel may enter the room wearing a gown and gloves when performing terminal cleaning. A facemask and/or eye protection should be added if splashes or sprays during cleaning and disinfection activities are anticipated or if otherwise required based on the selected cleaning products. Shoe covers are not recommended at this time for personnel caring for patients with COVID-19.

### **Q: What are the decontamination protocols for occupied public spaces, such as waiting rooms, etc.?**

A: Continue to clean and disinfect public spaces like waiting rooms and restrooms following the normal pattern of cleaning high to low, cleanest to dirtiest and emphasize high-touch surfaces such as handles, knobs, arms of chairs, faucet handles, etc. Use of a disinfectant from the [EPA List N disinfectant](#) is advised for routine disinfection of public spaces.

### **Q: Are there special requirements for COVID-19 trash disposal?**

A: No – CDC states “that management of laundry, food service utensils, and medical waste should be performed in accordance with routine procedures.”

### **Q: Are there special disinfection requirements for air handling units that are used to create COVID-19 units?**

A: While there are not any additional disinfection requirements for these AHUs, it should be noted that upon terminating the dedicated use of the unit, the entire unit should be ventilated a sufficient time for enough air changes to remove potentially infectious particles per [CDC Table B.1](#), based on the least amount of air changes in any given space within the unit.

**Q: Are there special considerations for wastewater and sewage from units that are used to create COVID-19 units?**

A: No – CDC states, “Waste generated in the care of PUIs or patients with confirmed COVID-19 does not present additional considerations for wastewater disinfection in the United States.”

**Q: With the potential shortages of PPE, should disinfection of PPE be performed?**

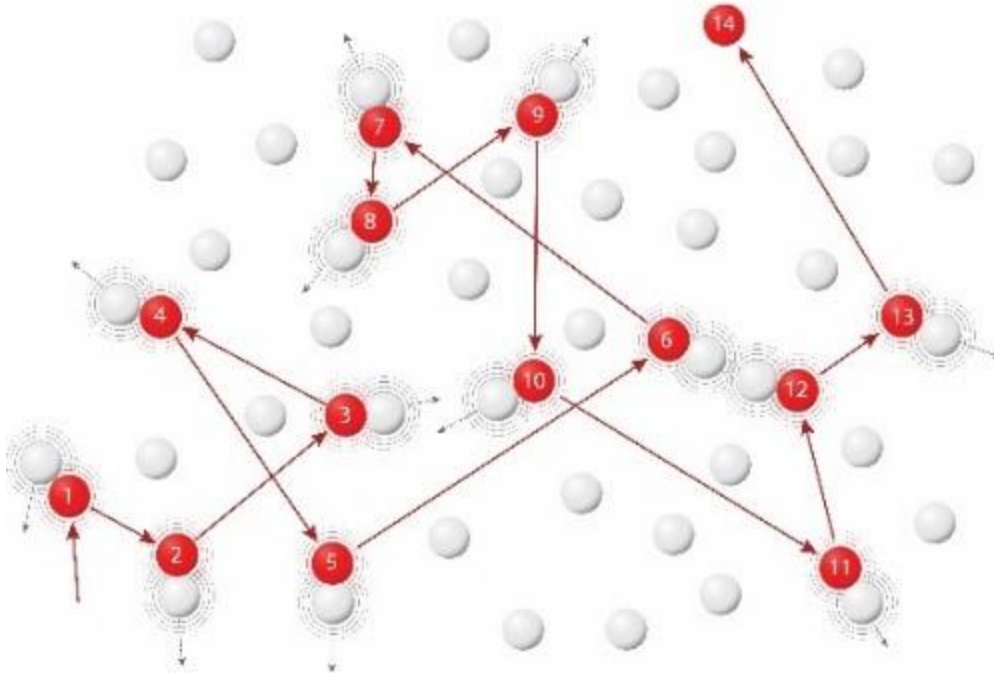
A: Ideally no. Extended use is the preferred method for optimizing PPE supplies. Extended use refers to the practice of wearing the same N95 respirator for repeated close contact encounters with several different patients, without removing the respirator between patient encounters. This type of usage should be determined by the professionals who manage the institution’s respiratory protection program, in consultation with their occupational health and infection control departments and with input from the state/local public health departments. For additional information, see the [CDC’s Strategies for Optimizing the Supply of N95 Respirators](#).

**Filtration**

**Q: Since the SARS-CoV-2 virus is smaller than 0.3 microns, why are HEPA filters recommended for it?**



# Brownian motion



A: This is due to Brownian motion, which is the random motion of particles suspended in a fluid such as air. Particles smaller than 0.3 microns are subjected to Brownian motion, which causes them to flow in a zig-zag motion as indicated in the illustration. Even though the particles could fit through the fibers of the filter, the particles' motion and size causes them to come into contact with the fibers and are captured by the filter media due to diffusion. Since particles that are 0.3 microns and larger are not impacted by Brownian motion, HEPA filters are tested at the 0.3 micron size, which is the most difficult particle size to capture. Therefore, even though the SARS-CoV-2 virus is smaller than the tested micron size, HEPA filters are even more efficient at capturing particles of this size than particles at 0.3 microns.

## Q: What MERV rating is effective in capturing the SARS-CoV-2 virus?

A: A MERV 16 rated filter is 95% or better efficiency for particles of 0.3 to 1.0 micron sizes. MERV stands for the *Minimum Efficiency Reporting Value* of a filter. It is a method of stating the filter's efficiency based on particle size and is determined by testing filter performance when exposed to particles of a known size in the air stream. Due to the Brownian motion particles smaller than 0.3 microns are trapped within filter media more efficiently than those of the 1.0 to 0.3 micron size thus the MERV 16 is the rating most effective in capturing the SARS-CoV-2 virus.

## Q: At what efficiency rate do HEPA filters work against COVID-19?

A: While HEPA filter efficiency is not tested with individual viruses, filters are tested by manufacturers according to methodologies as outlined in Recommended Practices (RP) as published by the Institute of Environmental Sciences and Technologies (IEST) and filter test



methods by the International Organization for Standardization (ISO). Filters are challenged with particles or aerosols of specific size and the penetration of each filter is recorded. HEPA filters are labeled based on their efficiency with various particle sizes.

## **Q: What safety and PPE measures should be taken when changing and transporting filters from air handlers serving COVID-19 patient areas?**

A: Due to the air flow through the filter, the SARS-CoV-2 virus will quickly desiccate and die. Additionally, the virus should adhere pretty well to the filter unless the filter is beaten or dropped. If this is a concern, then the use of a fixate, such as hairspray, on the filters could be considered. Disposal should be performed by bagging the filters and disposing them in normal trash.

## **Q: How often do you need to change HEPA filters on a negative air machine?**

A: Filters should be changed based on the facility's current policies and procedures and the negative air machine manufacturer's recommendation. After patient discharge the room should be left vacant long enough to allow sufficient number of air changes to remove potentially infectious particles per the [CDC Airborne Contaminant Removal Table](#). Due to the air flow through the filter, the SARS-CoV-2 virus will quickly desiccate and die and the filter change can be performed with normal maintenance PPE. Additionally, the virus should adhere pretty well to the filter unless the filter is beaten or dropped. If this is a concern, then the use of a fixate, such as hairspray, on the filters could be considered. Disposal should be performed by bagging the filters and disposing them in normal trash.