Use Instructions for HEPA Air Purifier Units

**Background**

An air filtration device is essentially an air purifier that removes pollutants and contaminants from the air, including dust, allergens, smoke, and other harmful particles, thereby improving indoor air quality and reducing the risk of respiratory problems and other health issues caused by poor air quality. Air purifiers are commonly used by those who suffer from allergies or asthma, such as for those living in areas with high levels of air pollution. In healthcare settings or other congregate settings, these units can greatly improve local air quality by removing the above-mentioned particulate matter while also removing airborne vectors (i.e., bacteria, viruses, etc.) responsible for illness, thereby creating a safer workspace for healthcare staff.

Although there are a multitude of such devices available on the market today from a variety of manufacturers, the ideal type for use in medical-type settings is the HEPA filter. Per the U.S. Environmental Protection Agency (EPA), HEPA is an acronym for "high efficiency particulate air [filter]" as officially defined by the U.S. Dept. of Energy.  This type of air filter is capable of removing at least 99.97% of dust, pollen, mold, bacteria, and any airborne particles with a size of 0.3 microns (µm). The diameter specification of 0.3 microns corresponds to the worst case; the most penetrating particle size (MPPS). Particles that are larger or smaller are trapped with even higher efficiency. Using the worst-case particle size results in the worst-case efficiency rating (i.e. 99.97% or better for all particle sizes).

**Common Use & Maintenance Practices**

TRC has provided a large quantity of HEPA air filtration units, primarily the IQAir HealthPro® Series, to various nursing homes, long-term care facilities, and residences for People with Developmental Disabilities (OPWDD) settings through the New York City Department of Health and Mental Hygiene (NYC DOHMH) program *Expanding Respiratory Protections for NYC LTCFs* funded by CDC’s Strike Teams funding. These HEPA air filtration units should be used and maintained as specified in the Manufacturer’s User Manual provided with the unit.

A summary of items critical to the continued operation of these units include:

* By default, follow a written maintenance policy for in-use equipment.
* Ensure proper sizing of the unit to the room/area. At least twelve (12) air room changes per hour are recommended during normal use (i.e., recirculation configuration) in a congregate medical setting.
* Place equipment away (>1.5’) from walls and corners to ensure air capture and proper air mixing.
* Place the unit as close to the resident/source as is reasonable to increase effective capture of the potential infectious/hazardous agents. Capture ability decreases rapidly with the distance from the source, so the distance from the patient has an impact on the ability to filter out droplet nuclei suspended in the air.
* Review room design and place the unit so that it does not draw contaminated air past the breathing zone of staff.
* Review room design and place the unit so that it does not blow directly against the resident.
* Be mindful of filter life and replace per manufacturer recommendations. Some units, such as the IQAir HealthPro® series, are equipped with static pressure sensors that inform maintenance staff when it is time to change the filter.
* When servicing the unit, always implement hygienic practices. For example:
	+ Develop a standard routine maintenance procedure to include routine cleaning and pre-filter/filter change outs.
	+ Ensure the individual performing cleaning has adequate PPE (i.e., N-95 respirator, clothing that covers the skin and can be changed, disposable gloves, etc.) to protect themselves.
	+ Perform maintenance procedures, including filter change-outs, safely away from any patient locations. A maintenance location with good ventilation and negative pressure (i.e., exhaust ventilation) is ideal. The area should be relatively confined/contained and also easily cleaned/decontaminated.
	+ Remove filters carefully to prevent harsh movements that may shake the particulates off of the filter. Place the filters directly into a waste bag, large and thick enough to hold the filter, and seal it closed by twisting and tying the top. Waste bags should be heavy duty to prevent puncture.
	+ Clean interior, accessible portions of the unit.
	+ Clean the work area using wet wiping and HEPA vacuum upon completion.
* Replace with filters approved for use with the specific unit in question. Date filters as appropriate to the maintenance procedure. Ensure filters are properly positioned in the unit, and undamaged. Any rips, holes, gaps, deformations in the filter, filter housing (frame) or between the filter and the filter housing will render the filter ineffective.
* Perform an operation and general safety (electrical and mechanical) check prior to placing back into the resident room.

**Negative or Neutral Pressure Modification**

HEPA air purifier units are designed to be used in rooms and other open spaces as described to “clean” the air through filtration and local area recirculation principles. Although this is the case, many units, including the IQAir HealthPro® Series ([https://www.iqair.com/us/products/ accessories-replacement-parts/outflow-w125](https://www.iqair.com/us/products/%20accessories-replacement-parts/outflow-w125)) provided by TRC can be modified by placement of an appropriately designed and equipment-specific ventilation hood adaptor directly over the exhaust vent. This adaptor directs exhausted air through a duct outside of the room and/or building. In this way, an air purifier can be used to to create a slight negative pressure which is highly desirable where a resident may be infectious.

Note that the effectiveness of creating negative pressure using the air purifying unit will diminish with increased room size and the effects of other ventilation systems present in the building. If true negative pressure is needed, an engineer will be needed to help design and commission the negative pressure system

Where such a hood fitting may not be available for a given unit (a minimum of 625 cubic feet per minute of exhaust is recommended), the services of a qualified ventilation engineer may be consulted to design such a device. More practically, an airlock accommodation may be placed at the room entrance (i.e., supplemental curtain wall) to effectively minimize airflow into the corridor and surrounding space(s). In this latter situation, a review of the existing ventilation system and room design would be required by maintenance and/or a qualified ventilation professional to determine the most successful overall approach. A qualitative evaluation by use of an air current tube under a variety of conditions (i.e., passersby, room or hall ventilation system active or inactive, etc.) can help to evaluate air flows within and between spaces to confirm the best design. It is critical to note that any such airlock should be in full compliance with facility and New York City Fire Code.