

Cleaning & Disinfecting Elastomeric Face Mask Respirators (EFMRs)



Elastomeric respirators, made of a resilient and rubber-like material, are designed to be reused an unlimited number of times. This means that they are also designed to be cleaned and disinfected on a routine basis without damage to their ability to fit the wearer or filter out hazardous pathogens. Repeated use and disinfection of N95 respirators can result in poorer fit and filtering ability. Because elastomeric respirators frequently fit better than N95s (more workers pass fit tests on elastomeric respirators than on N95s), they can be safely decontaminated and reused. And, due to the shortage of N95s during the COVID-19 crisis, healthcare facilities and workers are increasingly turning to elastomeric respirators as an adjunct to, or replacement for, N95s.

The CDC underscores this by stating that, "Because they can be re-used, elastomeric particulate respirators provide an alternative respiratory protection option to FFRs [filtering facepiece respirators, or N95s] for protection against pathogens." In fact, the CDC, NIOSH and OSHA

all recommend that elastomeric respirators be considered for use when there are concerns about obtaining an adequate supply of N95s.

As with any personal protective equipment used in the workplace, it is the employer's responsibility to have a written protection plan that spells out training, fit testing, cleaning, storing and maintenance procedures (OSHA 1910.124). Cleaning protocols vary depending on the manufacturer's instructions, OSHA regulations and the choice of the healthcare system in terms of individual cleaning and disinfection or centralized disinfection.

As an example, the University of Maryland Medical Center uses the following cleaning and disinfection protocols:

- Clean the respirator using four disinfectant wipes. Starting with the outside of the mask first, holding the inside of the mask with the other hand, clean the outside, then discarding that wipe, change

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gloves, moving to the inside of the mask, discarding that wipe, then the straps and discarding that wipe and finally the filter cartridge covers with a final wipe. A wet cloth can be used as a final step to clear any residual disinfectant off the areas that will touch the wearer's skin. Gloves can be donned and doffed at least twice while doing the procedure. This can be done at any time, after heavy use or as part of doffing/decontamination procedures.

- Clean the respirator using soap and water, or an EPA disinfectant. This process involves a pail or sink, warm water, gloves, chux and a small brush. The filter cartridges are taken off first, then the entire mask and head set are submerged in the cleaning solution. Tongs are used to keep the parts submerged. The outside and inside can be brushed.

Both of these protocols can be done either by the person assigned to the equipment or by other staff. Videos can be found at: <https://www.medschool.umaryland.edu/fpi/Novel-Coronavirus-COVID-19/Information-for-FPI-Clinical-Practices/Personal-Protective-Equipment-PPE/Respirators/>

Automated reprocessing can also be used. Hospital washer-disinfector units are set to 50c (122F), the upper limit for the material used in elastomeric respirators.

OSHA regulations on the cleaning of respirators sets out a protocol similar to the second one above. They state that alternate methods may be used, such as the manufacturer protocols, as long as they achieve the same goals of the OSHA protocol. OSHA does require that the equipment be immersed in disinfectant solution if the cleaning solution does not contain one. (Appendix B-2 to § 1910.134: Respirator Cleaning Procedures [Mandatory], Federal Register, 1998).

The Allegheny Health Network (AHN) obtained thousands of elastomeric respirators during the initial COVID-19 surge in the Spring of 2020. Initially AHN reassigned some operating room technical staff to create a respirator cleaning/maintenance team. After the crisis passed, AHN switched to having individuals responsible for their own respirator cleaning and disinfection.

Provided protocols are followed, either centralized or individualized cleaning can be effective at disinfecting the equipment. Some studies have found that soap and water alone are as effective as disinfectants. Other studies have found that while all disinfectants can reduce contamination significantly, bleach-based products can be somewhat more effective. A 2015 study found that, "Reusable facial protective equipment may be disinfected by health care workers with minimal training using SOPs [standard operating procedures]." (Source: Disinfection of reusable elastomeric respirators by health care workers: A feasibility study and development of standard operating procedures, American Journal of Infection Control, 43, 2015.)

Respirator Filter Cartridges

Elastomeric respirators have either one or two filter cartridges that attach to the mask. In a healthcare setting, with relatively little nuisance dust, these filters can be reused for long periods of time before they have to be replaced. This raises the question, however, of what hazard if any the trapped contaminants pose over time. In other words, can pathogens trapped by the filters then be released into the environment? Due to the design of the filters, which use electrostatic force to keep particles trapped in the filter material, pathogens do not exit the filters. So the filters can be used repeatedly provided the outside cover is wiped down. Individual filter cartridges can also be left to sit for 72 hours (shelf life for SARS-CoV-2), changed out with filters that have been allowed to "rest," – then repeat, switching back and forth between the cartridge sets.

Is proper use of an elastomeric respirator more complicated than just using disposable N95s?

When N95s are used as designed and intended (discarded after each patient case session), there are obvious advantages: you use it, toss it, and get another one. There are still comfort issues for extended use over shifts and days, and some fit concerns, but otherwise usage is pretty straightforward.

But as of March, 2020 and continuing today, N95s are not being used as designed and intended. In the context of N95 rationing and conservation measures (reuse, extended use, etc.) allowed under the CDC's contingency and crisis capacity guidelines, the protocols associated with elastomeric use are equivalent, or less complex, than those needed for N95 conservation. And because the equipment is designed for reuse, it can be cleaned and disinfected continuously. Testing on the viability of used N95 decontamination remains limited, and no methods have proven yet that there is no negative effect on fit, filtering ability and exposure to cleaning/disinfection chemicals while also removing all remnants of SARS-CoV-2 virus particulates. And even with N95 "decontamination," the CDC states that, after donning an N95 more than 5 times, there can be a significant effect on fit, thus leaving the wearer vulnerable to possible exposure.

Further, operational difficulty cannot and should not be a sole reason for failing to use equipment. If equipment is safer and more comfortable for users, those benefits can outweigh the additional facility responsibility for cleaning and maintenance.

Healthcare facilities that have integrated elastomeric respirators into their PPE supply have found that the equipment is safer, more comfortable and less expensive than the current price of N95s.

This is a major reason why Allegheny Health Network and other institutions have either switched to elastomerics entirely, or incorporated them partially in order to have a mix of equipment. "We were dealing with extended use of the N95s," AHN pointed out during the crisis last Spring, "dealing with possibly collecting and processing them for reuse, dealing with fit testing new and different N95 equipment constantly, and it made more sense to have reusable equipment in terms of time, effort, cost and safety."

For more information on alternative respiratory equipment and protocols for its use, contact the NYSNA Health & Safety staff at healthandsafety@nysna.org.

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