

Cleaning and Disinfecting 3M™ Versaflo™ Powered Air Purifying Respirator Assemblies following Potential Exposure to Coronaviruses

3M™ Versaflo™ TR-300, TR-300+, TR-600 and TR-800 Powered Air Purifying Respirator (PAPR) Assemblies

Description

During coronavirus outbreaks, some healthcare organizations may assign powered air purifying respirators (PAPRs) to workers providing care for patients with suspected cases of disease caused by coronavirus. This document contains considerations related to cleaning and disinfecting certain 3M PAPRs after potential exposure to coronaviruses. While this document primarily applies to the 3M™ Versaflo™ PAPR Systems, it is also relevant to 3M™ Airmate and Breathe Easy PAPRs.

The 2008 U.S. Centers for Disease Control and Prevention (CDC) publication [Guideline for Disinfection and Sterilization in Healthcare Facilities](#)¹ updated (May 2019) includes information on disinfecting equipment and surfaces potentially contaminated by coronaviruses. The CDC investigated many chemicals and cited several chemical germicides as being effective for coronaviruses, including sodium hypochlorite (at a free chlorine concentration of 5,000 ppm) when used as indicated in the product user instructions. In areas outside of the United States, where EPA-registered disinfectants may be unavailable, this CDC publication may be a useful supplement to applicable local guidance.

More recently, the CDC has published [Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 \(COVID-19\) in Healthcare Settings](#)² indicating that EPA-registered, hospital-grade disinfectants are appropriate for SARS-CoV-2 in healthcare settings. Refer to [List N](#) on the EPA Website for EPA-registered disinfectants that can be considered for use against Novel Coronavirus, SARS-CoV-2, that causes the COVID-19 disease.³ Locations in Canada may also want to refer to the [Health Canada List of Hard Surface Disinfectants for COVID-19](#).⁴

Of the chemicals listed by the CDC as being appropriate for use in connection with coronaviruses and those included on the EPA's registered list for use against SARS-CoV-2, only certain chemicals can be used with the 3M PAPR assemblies listed above per the 3M product *User Instructions* and the guidelines included in this document. Note that other disinfection products or solutions that may be recommended as effective for coronavirus have not been tested with 3M products. Using methods other than the chemicals recommended below may degrade materials and shorten the useful life of PAPR assemblies.

Possible disinfection methods*:

- Sodium hypochlorite solution (at a free chlorine concentration of 5,000 ppm) with 1 minute contact time.

If an EPA-registered disinfectant is required:

- Clorox Healthcare® Bleach Germicidal Disinfectant Wipes (EPA Reg. No. 67619-12)
- 3M™ C.diff Solution Tablets (EPA Reg. No. 71847-6)

- ECOLAB® KLERCIDE™ 70/30 IPA (EPA Reg. No. 1677-249)
- PeridoxRTU™ (EPA Reg. No 8383-13)
- Sani-Cloth® Bleach Germicidal Disposable Wipes (9480-8)

*These disinfecting solutions can also be considered for 3M™ Airmate™ and Breathe Easy™ PAPR assemblies

WARNING: Due to the high frequency of disinfection of PAPR blowers and batteries; end-users have reported plastic deterioration with certain disinfectant products. Issues have been reported with use of Sani-Cloth AF3 Germicidal Disposable Wipes (EPA Reg No 9480-9) and also Super Sani-Cloth® Germicidal Disposable Wipes (EPA Reg No 9480-4) – which have been removed from our list of potential disinfectants. Bleach based and isopropyl alcohol based disinfectants have not been reported to cause deterioration of our PAPR blowers and batteries.

Always read and follow the user instructions and/or EPA label for your selected disinfectant. 3M strongly recommends that a water rinse/wipe down occur after disinfection to thoroughly remove disinfection solution and reduce the possibility of user irritation and premature degradation of equipment.

Your facility should review all applicable information thoroughly prior to selecting a disinfecting product for your equipment and specific application. Follow the hygiene and infection control practices established by your employer for the targeted organisms, including coronaviruses. Please note that evaluation of the effectiveness of this agent with regards to inactivating viruses has been performed by the CDC or disinfectant manufacturers, not by 3M.

Please always refer to the latest information from trusted sources such as the World Health Organization ([WHO](#)), the US Centers for Disease Control and Prevention ([US CDC](#)), the US Occupational Safety and Health Administration ([OSHA](#)) and the European Centres for Disease Prevention and Control ([ECDC](#)) regarding selection, use, maintenance and cleaning of personal protective equipment.

Note that components of PAPR respiratory systems may become damaged over time with prolonged or extended use of disinfecting products. As discussed in the product *User Instructions*, users must inspect the components of their PAPR respiratory systems following each disinfecting cycle and prior to re-use. If you discover any signs of damage, remove the component from service and either discard and replace or repair as appropriate, following the guidance in the product *User Instructions*.

Cleaning and Disinfecting the TR-300, TR-300+, TR-600 and TR-800 PAPR Assemblies

It is important to always read and follow the specific PAPR and headcover/hood *User Instructions*. The following general guidelines can be utilized as an additional reference for cleaning, sanitizing, and/or disinfecting your TR-Series PAPR assembly. Please also refer to the [3M Technical Bulletin on Inspection, Cleaning and Storage Procedures for 3M™ Versaflo™ TR-300, TR-300+, and TR-600 PAPR Assemblies](#) or [Inspection, Cleaning and Storage Procedures for 3M™ Versaflo™ TR-800 PAPR Assemblies](#).

General

- 1) Cleaning is recommended after each use. Nitrile or vinyl gloves should be worn during cleaning as well as other personal protective equipment (PPE) as indicated.
- 2) With any disinfecting agent, follow the *User Instructions* and/or EPA label in regards to usability, application and contact time.
- 3) Ensure all components are thoroughly rinsed with fresh, warm water and thoroughly dried before use or storage.

Initial Steps and Inspection

- 1) It is important to follow the User Instruction inspection procedures supplied with the TR-Series PAPRs and headcover or hood to identify any damage, excessive wear, or deterioration of components and replace them as necessary.
- 2) Detach the belt from the motor/blower and the headcover/hood from the breathing tube. Remove all the plastic clips from the belt (if present).
- 3) Discard the breathing tube cover, if one is used.
- 4) If a filter change is needed, remove the filter from the PAPR blower assembly– see the filter change section below.

Cleaning

If cleaning to remove gross soil before disinfection, clean all parts of the PAPR assembly with a clean soft cloth dampened with warm water containing a mild pH neutral (pH 6-8) detergent (refer to specific product *User Instructions* for water temperature guidance).

While the breathing tube is still attached to the blower, begin cleaning with the exterior of the breathing tube, then the exterior of the blower/battery. Avoid allowing liquid to enter the breathing tube. Remove the battery, and wipe the top of the battery and the battery cavity of the blower. Avoid wiping the blower pins and battery pads. Wipe the belt and headcover/hood. Refer to the *User Instructions* for each component for cleaning details. Do not soak the headcover/hood during cleaning. Replace the cloth if it becomes visibly dirty.

Disinfecting

Disinfect the PAPR assembly with the disinfectant cleaner. Follow the user instructions and/or EPA label for the selected disinfectant. Surfaces must be visibly wet with disinfectant for the full specified contact time.

With breathing tube attached, start by wiping the exterior of the breathing tube and the top of the blower outlet. Remove the breathing tube. If cleaning and storage plugs are available for your blower model (TR-600 or TR-800), secure the blower outlet plug. Then, taking care not to allow liquid to drip into the blower, disinfect the rest of the blower body, battery, belt and headcover/hood, avoiding the blower pins and battery pads.

Rinse

Remove disinfection solution from the PAPR assembly by wiping with a clean cloth dampened with fresh water. Rinse the cloth often to help ensure effective removal of the disinfectant solution. Do not allow liquid to enter the air outlet port.

Alternatively, certain components may be submerged in a tub of fresh water: the belt and breathing tube. The TR-600 and TR-800 blowers, with the cleaning and storage plugs in place, can also be submerged in fresh water for rinsing. **Do not submerge other blowers. Do not submerge the TR-600 or TR-800 blowers without cleaning and storage plugs in place.**

Dry

All components should be allowed to air-dry completely prior to reuse or storage. Air dry in an uncontaminated atmosphere, temperature not to exceed 49 °C (120 °F). Breathing tube drying can be accelerated by connecting it to the motor/blower unit and using it to force air through the tube until dry. If using this method, orient the blower and breathing tube in such a way that prevents liquid from entering the blower.

After Cleaning and Drying

- 1) Reassemble unit as described in the *User Instructions*.
- 2) Inspect the PAPR unit and headcover/hood following the inspection procedures in the *User Instructions* for that item.

The 3M™ Versaflo™ Storage Plug BT-957 is an optional breathing tube accessory that can be used during storage of BT-Series breathing tubes.

Disinfection and Reuse of PAPR Headcovers/Hoods

Disinfection of the exterior of PAPR headcovers/hoods for reuse can be considered as outlined in this bulletin, taking into consideration your facility's infection control policy and the user instructions and/or EPA label for your selected disinfectant. When disinfecting the headcover/hood exterior, the same cleaning, disinfecting, rinsing and drying wipe-down steps can be followed as outlined for the PAPR blower and other components.

Disinfection of the interior of the PAPR headcover/hood has not been evaluated, in part because these are expected to be individually assigned and not shared among workers. If disinfection of product interior is required at your facility, the same cleaning, disinfecting, rinsing and drying wipe-down steps can be considered as outlined for the product exterior and other PAPR components. If disinfecting headcover/hood interior, ensure thorough inspection as outlined by your specific product *User Instruction*, paying special attention to the condition of the uncoated fabric on the headcover/hood interior. Some cleaning and/or sanitizing products can pose health risks if they come into contact with a user's skin. Customers must ensure that their PPE cleaning and sanitization procedures are within established safe levels and do not result in exposures to cleaning/sanitizing chemicals at levels capable of causing adverse health effects.

The "in-use" life of headcovers/hoods will vary with frequency and conditions of use. Determination for reuse of PAPR headcovers/hoods will be dependent on product condition and as indicated in the User Instructions and your facility's infection control policy.

To determine product condition, follow the inspection guidance located within the *User Instructions* before and after each use. These instructions may vary slightly depending on the headcover/hood being used. The inspection instructions for the 3M™ Versaflo™ S-Series Hoods and Headcovers, as well as BT-Series Breathing tubes, are as follows:

Carefully:

- Examine the condition of the fabric, head suspension, visor, outer shroud and as applicable, inner shroud, collar or elasticized face seal. Check that there are no cracks, rips, dents, holes, tears, or other damage.
- Look closely at the stitching. Ensure stitching is intact and there is no unraveling or gaps in the seams. There should be no tears or holes that could permit contaminated air to enter the hood or headcover.
- If using the S-800 series hood, closely inspect the sealed seams for rips, holes, tears, or other damage. Ensure side ties are present and undamaged.
- Look for scratches or other visual distortions that could make it difficult to see through the visor.
- Examine the head suspension for cracks or other damage.
- Examine the entire breathing tube. Look for tears, holes, cracks, distortions, or any other sign of wear or damage. Bend the tube to verify that it is flexible. Ensure the gasket located in the QRS (i.e. the end connection to headgear) is present and not damaged. If using a BT-Series breathing tube, inspect the gasket located on the bayonet end of the breathing tube (i.e. the end that connects to the air source) for signs of damage. The breathing tube should fit firmly into the air source connection.

DO NOT:

- Use detergents that contain lanolin or other oils.
- Wipe the visor with strong solvents such as MEK, acetone, or toluene as those may damage or distort the visor.
- Soak components in cleaning solutions or solvents.
- Wash in a washing machine or respirator washer.
- Use sterilization processes such as ethylene oxide, radiation and steam sterilization, as they may damage the components.

- Submerge or soak breathing tubes with foam mufflers in any fluids.
- Use sterilization processes such as vaporized hydrogen peroxide (VHP), as this may leave unacceptable levels of residual VPH.

If you discover any signs of wear and/or damage, discard the component and replace it with a new one. Failure to do so may affect respirator performance and reduce the degree of protection provided, and may result in sickness or death.

If you currently use an alternate headcover/hood product, please refer to the product specific *User Instructions* for applicable guidance.

When to Change PAPR Filters Used to Help Reduce Exposure to Airborne Biological Aerosols

Particulate filter change schedules for PAPRs are determined by two main considerations: filter loading (clogging of the filter from captured particulates) and a facility's infection control policy.

If the PAPR system is being used to reduce exposure to airborne biological aerosols such as droplets containing viruses or bacteria, the filter will not typically load from these particles to the point that they will affect the airflow for the PAPR as determined by the airflow indicator or the PAPR airflow indicator alarm. As a result, loading or clogging of PAPR filters is typically not an issue when used for biological aerosols.

In healthcare facilities, PAPR filter change schedules for airborne biological aerosols are primarily determined by the facility's infection control policy. The infection control policy should be developed based on applicable national, state, and local guidelines. Most healthcare organizations develop their filter use and reuse policy based on the biological agent of concern, likelihood of the filter becoming contaminated, and potential for patient-to-patient and patient-to-worker cross-contamination. While the outside filter body can be wiped down for cleaning, do not attempt to clean the filter media inside the filter body. When changing the PAPR filter, follow the hygiene and infection control practices established by your employer based on the specific contaminants to which the respirator assembly has been exposed and the cleaning agent used. Dispose of the filter according to your infection control policy and all applicable requirements.

Close consideration needs to be given to the policies and practices used for cleaning the PAPR. It is important to remember that a PAPR is used to filter out contaminants from the air, and therefore contaminants are concentrated on the filter/cartridge itself, and potentially on other surfaces of the PAPR system. Proper cleaning and maintenance instructions and considerations for PAPR systems can be found in the specific *User Instructions* for each product.

Select User Instructions

- [3M™ Versaflo™ Powered Air Purifying Respirator TR-300 Belt Mounted Assemblies](#)
- [3M™ Versaflo™ Powered Air Purifying Respirator TR-300+ Belt Mounted Assemblies](#)
- [3M™ Versaflo™ Powered Air Purifying Respirator TR-600 Belt Mounted Assemblies](#)
- [TR-630 and TR-632 Battery Packs used with TR-641N, TR-644N Battery Chargers](#)
- [3M™ Versaflo™ Powered Air Purifying Respirator TR-800 Belt](#)
- [TR-830 Battery Pack, used with TR-641N, TR-644N Battery Chargers](#)
- [3M™ Versaflo™ S-Series Hoods and Headcovers](#)

Glossary of Terms

Below is a glossary of terms used in this document^{5, 6}:

Cleaning: Removal of all soil (organic and inorganic) and foreign material from objects and surfaces. This is typically accomplished with water and mechanical action. Detergents may be used to assist the process.

NOTE: Failure to remove foreign material (soil, face oils, etc.) from an object can adversely affect the disinfecting process.

Disinfecting: A process of inhibiting or destroying disease-producing microorganisms (but may not kill bacterial spores). It usually involves the use of chemicals, heat, and/or ultraviolet light and is divided into three categories: high, intermediate and low-level disinfection.

Before using any of the products or information detailed herein, you must evaluate it and determine if it is suitable for your intended use. You assume all risks and liability associated with such use. 3M makes no warranties relating to the efficacy of any of the products detailed herein in preventing the spread and/or contraction of coronavirus. 3M will not be liable for any loss or damage arising from any information contained herein, whether direct, indirect, special, incidental or consequential, regardless of the legal or equitable theory asserted, including warranty, contract, negligence or strict liability.

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If you have any questions or concerns, please contact your local 3M representative.

References

- 1) Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008; updated 2019. United States Centers for Disease Control. William A. Rutala, Ph.D., M.P.H., David J. Weber, M.D., M.P.H. and the Healthcare Infection Control Practices Advisory Committee (HICPAC). 2008. <https://www.cdc.gov/infectioncontrol/pdf/guidelines/disinfection-guidelines-H.pdf>
- 2) Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease (COVID-19) in Healthcare Settings. Coronavirus Disease (COVID-19). <https://www.cdc.gov/coronavirus/2019-ncov/infection-control/control-recommendations.html>
- 3) List N. EPA's Registered Antimicrobial Products for Use Against Novel Coronavirus SARS-CoV-2, the Cause of COVID-19. United States Environmental Protection Agency. 03/03/2020. <https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>
- 4) Hard-surface disinfectants and hand sanitizers (COVID-19): List of hard-surface disinfectants. Health Canada, Government of Canada. <https://www.canada.ca/en/health-canada/services/drugs-health-products/disinfectants/covid-19/list.html>
- 5) Rutala, WA. American Journal of Infection Control. APIC Guideline for Selection and Use of Disinfectants. Vol. 24, No. 4, pp. 313-342, August 1996.
- 6) Rutala, WA. CDC. Guideline for Disinfection and Sterilization in Healthcare Facilities. 2008.

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