

Powered Air Purifying Respirator (PAPR) Training 3M Versaflo

Please review the presentation and complete the quiz, which is located on the last page.

Division of Occupational Health & Safety
Technical Assistance Branch
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A note to Contract Employees (non-FTE Employees)

We welcome non-FTE personnel to utilize this training material. The NIH, however, does not certify or train non-FTE personnel for compliance with the Occupational Safety and Health Administration (OSHA) unless expressly stated as such in the contract language. Training records for non-FTE personnel are not maintained. The responsibility to provide site-specific training following OSHA standards lies solely with the employer.

Objectives

At the end of this training, personnel will be able to:

- Explain the function and use of a PAPR
- Demonstrate knowledge of performing pre-operational inspection of the PAPR
- Understand the limitations of the PAPR
- Describe the proper storage of the PAPR
- Demonstrate proper cleaning/disinfection and or disposal of contaminated PAPR components following use
- Identify potential occupational hazards associated with PAPR usage

When a Respirator is Required

- OSHA's respirator standard, 29 CFR 1910.134, requires respirators to protect employees from breathing contaminated and oxygen-deficient air when adequate engineering controls are not feasible or while the rules are being instituted.
- Healthcare facilities, research facilities, animal handling facilities, laboratories, and facilities maintenance activities all have the potential to generate airborne contaminants via process, action, or job. These contaminants can be biological, chemical, or radiological.

Air Purifying Respirator

- N-95 Respirator
- Half Face Respirator
- Full Face Respirator
- Powered Air Purifying Respirator (PAPR)
 - Loose Fitting
 - Tight Fitting

Air Supplying Respirators

- Supplied Air Respirator (SAR)
- Self-Contained Breathing Apparatus (SCBA)

A PAPR is an air-purifying respirator that removes particulate gases, vapors, aerosols, or a combination of contaminants from the air through filters, cartridges, or canisters. PAPRs do not supply oxygen and, therefore, cannot be used in an oxygen-deficient atmosphere or immediately dangerous to life or health (IDLH).

Information regarding PAPRs:

- Reusable components and replaceable filters or cartridges
- Can be used to protect against gases, vapors, or particulates if equipped with the appropriate cartridge, canister, or filter
- Battery-powered with motor/blower that pulls air through attached filters or cartridges, filters out contaminants, and creates a positive pressure within the headpiece
- Provides eye protection
- Low breathing resistance
- Loose-fitting PAPR does NOT require fit testing and can be used with facial hair
- Tight-fitting PAPR requires fit testing

OSHA (1910.134) Requirements for PAPR Use

- Respirator use may place a physiological burden on personnel that varies with the type of respirator worn, the job and workplace conditions in which the respirator is used, and the employee's medical status.
- A medical evaluation is required to determine the employee's ability to use a respirator. Occupational Medical Service (OMS) provides this service for NIH employees and all employees enrolled in the bio-surety program
- Initial training on the selection, use, maintenance, storage, and limitations of the respirator used is required
- Annual refresher training after that is required.
- A NIOSH-approved PAPR is required
- Fit testing is **NOT** required for loose-fitting PAPRs

A PAPR equipped with the proper filter(s) is intended to reduce or eliminate potential exposures to airborne contaminants (biological and chemical).

The airborne hazards must be known before selecting PAPR cartridges.

The most common types of cartridges utilized are:

- High Efficiency (HE) a.k.a. HEPA a.k.a. P100 respirator
- Organic Vapor (OV)
- Acid Gas
- Formaldehyde



Note that some cartridges come in combinations. Utilizing a HE/OV combination cartridge is widespread when biological and chemical airborne hazards are anticipated.

Loose Fitting PAPR Operation

- A PAPR system uses a blower instead of lung power to draw air through the filter. This allows the user to breathe comfortably with less resistance, as the airflow is delivered directly into the headgear from the blower.
- The positive pressure in the hood prevents ambient air from entering the breathing space, thereby reducing or eliminating exposures to airborne contaminants.



Components of a PAPR

- Motor & Blower Unit
- Filtering Accessories
 - Filters
- Battery Pack
- Air tube
- Head (Face) Piece
 - Hood or Helmet

Accessories included in kit



1. TR-6710N (HE) Filter
2. TR-602N PAPR Unit
3. TR-630 Standard Battery
4. TR-627 Easy Clean Belt
5. TR-6700 Filter Cover
6. TR-6600 Prefilter (X2)
7. TR-662 Spark Arrestor (X2)

Pre-Operational Inspection

All PAPRs must be inspected before each use to ensure good operating conditions and maximum protection from airborne contaminants.

The following components must be inspected before each use:

- Motor/blower
- Filters and Filter Accessories
- Headgear
- Belt
- Battery Pack
- Battery Charger
- Air Tube

Pre-Operational Inspection

Motor/Blower

- The filter cover and main housing must be intact with no cracks, holes, or other damage. The plastic should not be discolored, chalky, or soft, as these may be signs of deterioration of the housing.
- The area under the filter or filter/cartridge should be clean and free of contaminants. Contamination noted here may indicate improper/lack of filter installation or damage to the filter or filter gasket.
- The outlet of the motor/blower (i.e., where the breathing tube attaches) should be inspected for any damage, dirt, debris, or other contamination that may interfere with the proper attachment of the breathing tube.
- The ON/OFF switch should be intact with no cuts, tears, or holes.
- The filter release button should function smoothly and securely hold the filter, filter/cartridge onto the motor/blower.
- The filter cover should sit securely on the filter or filter/cartridge.

Filters and Filter Accessories

- The filter/cartridge and filter cover should be intact without cracks, tears, or other damage.
- Closely inspect the filter plastic housing, the corners and latches, the outer rectangular barrier, and the inner circular filter seal gasket for cracks, tears, cuts, distortion, indentations, or debris.
- The filter should be intact, with no cracks, tears, or other damage noted. If the filter is wet or heavily loaded, it should be replaced.

Headgear

- Headgear must be intact without cracks, holes, or other damage.

Belt

- Inspect the belt buckle for damage, such as breaks or cracks. Inspect the belt leads for cuts and tears. Inspect the hip belt for tears and integrity.

Battery Pack

- Inspect the battery pack for cracks, holes, or other damage. The plastic case should not be discolored, chalky, or soft.
- The battery pack electrical contacts should be clean and dry without corrosion.
- The battery pack release button should move freely and function properly.

Battery Charger

- Inspect the power base and cradle for cracks or other damage.
- Inspect the power cord for frayed wires or other damage.
- Ensure the charger tray is clean, dry, and free of debris

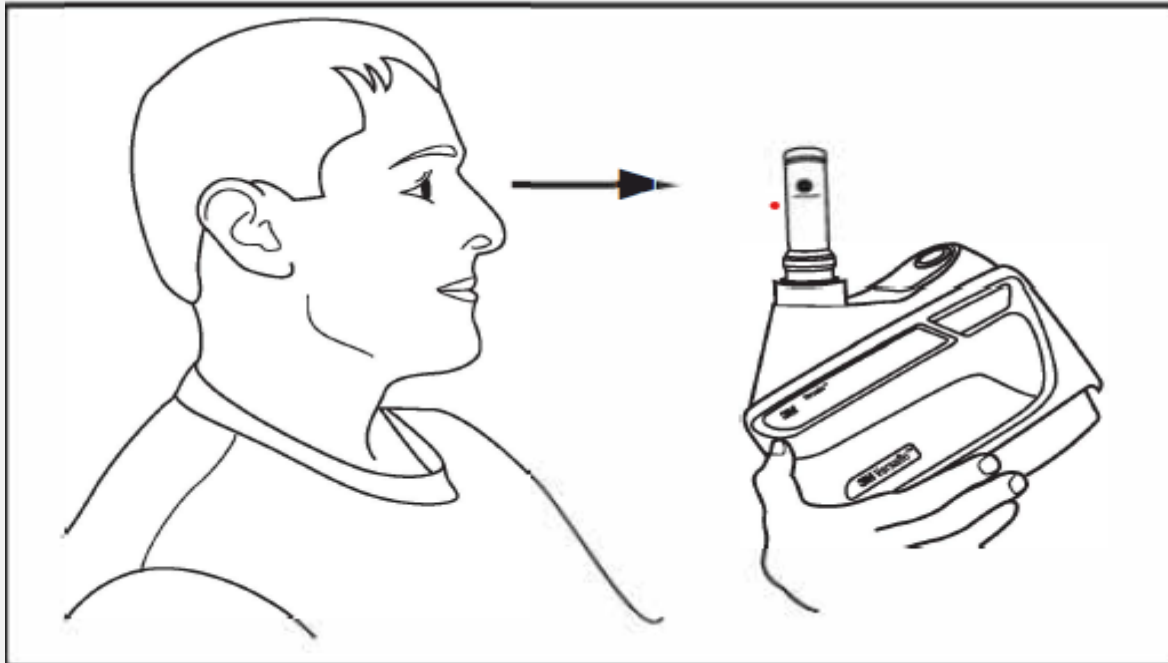
Air Tube

- Must be intact with no cracks, holes, or other damage.
- Must be unobstructed.

Airflow Testing

- Connect the specified (specific to the model of PAPR) airflow indicator to the PAPR. Note that depending on the model, the air tube might need to be removed to facilitate the insertion of the indicator.
- Attach the appropriate filter/cartridge and remove any filter/cartridge caps; turn on the PAPR.
- Allow up to 1 minute for the airflow to stabilize
- With the airflow indicator in a vertical position, ensure that the bottom of the floating ball rests at, or above, the minimum flow mark
- If the float ball inside the airflow indicator tube does not provide the minimum airflow of 6 cfm, the airflow is insufficient. Do not use the PAPR until the unit is serviced.

Airflow Testing



Donning the PAPR

- Mount the belt unit (blower and cartridges) on the waist and adjust the belt until comfortable.
- Put the headpiece on and connect the breathing tube.
- Engage motor/blower.



Cleaning/Disinfection

- While the PAPR system is together and still running, conduct a general wipe down/removal of dust and debris with a soft brush or cloth before disassembly.
- The remainder of the cleaning steps should be conducted outside the hazardous area (unless part or all of the PAPR is contaminated) with the blower turned off. Inspect all parts for damage or other signs of excessive wear. Replace all damaged parts before storage or subsequent use.
- Note that the procedures for cleaning, disinfection, and disposal of PAPRs utilized in BSL 3/ ABSL 3 are regulated and under the purview of the Biosafety Office. Please get in touch with Biosafety regarding using and disposing of PAPRs in BSL 3/ ABSL 3.

Motor/Blower

- Clean the outer surfaces of the assembly and battery pack with a soft cloth dampened in water and mild, pH-neutral detergent. Do not use solvents or abrasive cleaners. Do not attempt to clean the interior of the motor/blower with compressed air or vacuum.

Battery/Battery Pack

- While still on the blower, wipe the housing of the battery pack with a soft cloth dipped in the mild cleaning solution. Then wipe with a soft cloth dipped in clean water. Wipe dry.
- Remove the battery and wipe down the top of the battery pack, if needed, with a soft dry cloth. Avoid contact with the blower/charger connection pads; if they become damp, allow them to dry before reinstalling them.

Breathing Tube

- Detach the breathing tube with the unit upside down.
- Clean the connection sites on the breathing tube with the water and detergent solution. The breathing tube can be immersed in water for cleaning if required. The inside of the tube must be thoroughly dried before use or storage.
- Air dry, or dry by connecting to the motor/blower unit and using it to force air through the tube until dry. Orient the tube to prevent water from running into the blower.

Belt

The hip belt can be cleaned with a soapy water solution. Wipe or rinse all belts thoroughly and dry them completely before use.

Storage

- Store in a clean/dry environment, away from contaminant dust, gases, or vapors. Filters/cartridges may be stored attached to the blower. Do not hang the blower or headgear by the breathing tube or turn the blower from the headgear.

Disposal

- Disposal of PAPRs utilized in BSL 3/ ABSL 3 is regulated under the Biosafety Office's purview. Contact Biosafety for proper disposal procedures.
- Non-contaminated components can be disposed of as solid waste. Contact Biosafety for disposal requirements of contaminated PAPR
- Dispose of/recycle lithium-ion battery packs by federal, state, and local environmental regulations.

- Not for use in oxygen-deficient atmospheres (>19.5%) and oxygen-enriched atmospheres (<22%)
- Not use in the Immediately Dangerous to Life or Health (IDLH) contaminant concentrations
- Do not use if the airflow is less than six cubic feet per minute. (6 cfm)
- Do not wear PAPR if contaminant concentration is unknown
- Do not use incompatible parts. Only utilize PAPR with factory parts or manufacturer-approved replacement parts
- Do not use until you read and understand the manufacturer's operating instructions.
- Do not wear PAPR if atmospheres are flammable or explosive.

Potential Occupational Hazards Associated with PAPR Use

If an employee utilizing a PAPR experiences the following situations, they should leave the area immediately, discontinue PAPR use, and seek medical attention if required.

- The airflow stops or falls below six cfm
- The PAPR alarms
- Filter breakthrough (smell of chemistry or biologicals in the headpiece)
- Dizziness
- Difficulty Breathing
- Respiratory Distress
- A change in activity or workplace configuration that could add additional or unknown stressors to the employee and or PAPR

References:

- Websites:
- <https://multimedia.3m.com/mws/media/1000746O/3m-versaflo-tr-600-quick-start-guide.pdf>
- <https://multimedia.3m.com/mws/media/1427970O/3m-versaflo-papr-tr-600-series-user-instructions.pdf>
- https://www.3m.com/3M/en_US/p/d/v000057741/
- https://www.3m.com/3M/en_US/respiratory-protection-us/products/papr/
- Video:
- <https://multimedia.3m.com/mws/media/1275651O/disinfect-your-3m-versaflo-tr-300-powered-air-respirator-papr.mp4>
- <https://www.youtube.com/watch?v=rUXEaiLQt04>

- **General Respiratory Protection Program Questions**
 - Division of Occupational Health and Safety (DOHS)
 - NIHrespirator@mail.nih.gov
 - 301-496-3457 or 301-402-1618
- **Medical Screening and Medical Related Questions**
 - Occupational Medical Service (OMS)
 - 301-496-4411

Quiz Link

- Please complete your training with the quiz to obtain the official training records.

[3M Versaflo PAPR quiz](#)

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