

Specific Procedures for the Use of Powered Air-Purifying Respirators (PAPRs)

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This attachment is meant to supplement the Respiratory Protection Program and is specific to the use of powered air-purifying respirators (PAPRs). This appendix should be used in conjunction with the PAPR manufacturer's operation manual.

Selection and Use

PAPRs will be used in situations where adequate protection with an air-purifying respirator is appropriate. Units will be equipped with either a tight-fitting full facepiece or a loose-fitting hood or helmet. The loose-fitting headgear may be worn in areas where individuals are not required to shave but have a need for respiratory protection given that this is an appropriate level of protection as determined by EHS.

PAPRs will not be utilized for situations where the hazardous substance lacks adequate warning properties (odor or taste), or the air concentration exceeds that which could adequately be protected from the use of a negative pressure air-purifying respirator. It will also not be used for emergency response situations in which an oxygen deficiency or IDLH atmosphere may be encountered.

All PAPR units must be NIOSH approved.

Authorized Users of PAPRs

All potential users of PAPRs must contact EHS at 734-647-1143 and comply with all provisions of the Respiratory Protection Program and this attachment. Authorized users must meet the following specific criteria in addition to the criteria set forth in the Respiratory Protection Program:

- The PLHCP must determine that the user is physically able to wear a PAPR and perform work.
- If tight fitting, individual must be fit tested by EHS with a facepiece of the same make, model, and size as the PAPR unit that will be assigned to the user. A fit test may be conducted annually if the usage is determined to be mandatory. Fit testing will not be required if a loose-fitting facepiece is used.
- A tight-fitting PAPR user must attend EHS training at the time of fit testing and will receive refresher training from EHS annually.
- For those mandatory users wearing loose-fitting systems that do not receive annual fit testing, Online training modules for the specific PAPR used is available through LITMOS (F&O) or MyLINC.
- Sight-impaired users can be fitted with prescription glass inserts for use inside a tight-fitting full-facepiece. Employees will be provided with safety prescription eyewear through the University Prescription Eyewear Program (Refer to EHS's [Procedures for Obtaining Prescription Safety Glasses](#)). In lieu of glass inserts, contact lenses may be worn with full-facepiece respirators if they are rigid gas permeable or soft (hydrophilic) lenses, except in atmospheres containing acrylonitrile, methylene chloride, 1,2-dibromo-3-chloropropane, ethylene oxide, and methylene dianiline.

Hard, nonpermeable contact lenses shall not be worn with full-facepiece respirators. Contaminants entering the facepiece may cause serious and incapacitating eye irritation.

- Current authorized users of PAPRs include the following:
- Tight-Fitting PAPR:
 - Asbestos removal trained personnel in Facilities and Operations
- Loose-fitting PAPR:
 - Various shops in Facilities & Operations including CPP, Utilities, Paint Shop, Construction Services personnel
 - ULAM, BSL2/ABSL3, personnel assigned specific duties that require use
 - Athletics Personnel
 - Various Housing and Hospital Maintenance personnel

Location and Storage

Respirators should be stored to protect them from weathering, contamination, and deterioration. The respirator should be located so that unauthorized users cannot “borrow” to enter the area.

Batteries should be charged in a location that is maintained at room temperature. Temperature extremes may shorten the capacity of the battery unit. Batteries should not be recharged in an enclosed area that lacks ventilation and charging units should not be stored on top of each other.

Standard Operating Procedures

Before entering an area where PAPRs are used, the following procedures must be followed:

1. Conduct an inspection of the facepiece unit to assure proper working order of all components. Check the lens for scratches, nicks, and gouges. Check the skirt, head strap, and buckles for any signs of damage or wear. Hoods or head covers should be checked for any holes/tears in the material.
2. Appropriate cartridges should be attached to the unit. Refer to the Respiratory Protection Program for information pertaining to cartridge selection and change-out schedules.
3. Batteries should be checked to ensure that they are fully charged. Do not store the battery on the charger.
4. A flow check should be conducted according to the manufacturer’s guidelines. Acceptable airflow is four cubic feet per minute (cfm) for tight-fitting facepieces and six cfm for loose-fitting facepieces.
5. When all the above provisions are in place, the authorized employees may don the PAPRs in accordance with the manufacturer’s specifications and enter the work area. It is recommended to wear the facepiece under any protective outerwear that covers the head.

Cleaning

Individually assigned respirators should be cleaned and maintained by the user as needed. Shared PAPRs shall be cleaned and disinfected after each use in accordance with the manufacturer’s operation manual. PAPR components (motor/blower, battery, breathing tube) and hoods should not be immersed in liquids and instead should be wiped down with a damp towel or sponge.

Battery Maintenance

There are two options for battery pack maintenance:

- Assign each user a battery pack and charger to individually maintain a charged battery; or
- Establish a central battery management system where an individual will be responsible for charging and distributing the batteries to the users.
 - The central management system is usually effective in situations with large numbers of users.

When maintaining batteries, only use the charger supplied with the battery pack. The user should connect the battery to a charger at the end of each work shift and disconnect it at the beginning of the next shift. If a central charging area is used, the batteries should be clearly marked to avoid accidental usage of uncharged batteries. Reserve batteries should be available.

An expected run-time test should be conducted to determine the number of hours the battery will be able to power the respirator at the acceptable airflow rate. The battery should be fully charged prior to start of the test and the PAPR must be equipped with all cartridges, breathing tube, and head piece. The PAPR should maintain the required airflow for eight hours or the unit needs troubleshooting or repair. Follow manufacturer's instruction for conducting this test and for troubleshooting.

Batteries should be recharged when the recharge indicator light is on (if equipped) or when reduced airflow is detected. Note that an overloaded filter may also cause reduced airflow. **Batteries should not be charged continuously for more than one week.** This will cause deterioration of the battery pack due to heat generation. A typical service life for a nickel-cadmium ("NiCad") battery pack is 500 charge/discharge cycles.

For infrequent PAPR usage, it is recommended that battery packs be initially charged fully, and then follow the manufacturer's suggested schedule for maintenance of a full charge. This will prevent storage losses that may occur if periodic charging does not take place. Batteries subjected to long periods of storage (longer than 1-year) may lose their capacity to hold a full charge. Executing several charge and discharge cycles may restore Battery capacity.

Maintenance

When any aspect of the PAPR system fails to work properly, the system must be immediately red-tagged. An authorized service facility with factory-trained technicians should be contacted for repair. Contact your vendor or EHS for contact information.

Battery Repair and Disposal

Some batteries can be repaired if problems arise. Consult the manufacturer or EHS for more information. Battery packs that have reached the end of their service life due to damage or age should be placed in a campus battery recycling collection box.

New Equipment Purchase

EHS should authorize purchases of PAPR systems.

PAPR Training Information Checklist

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| USE | Why respirator is needed; hazards of substance |
| | Inspection: Pre-check helmet, belt, tubing, cartridge position, battery life prior to each use. Conduct airflow monitoring to ensure maximum airflow available. |
| | Belt: Up arrow indicates correct positioning. Velcro tighten for snug fit. |
| | Don & Doffing: Includes instruct user how to don and doff the PAPR. Helmet tension, airflow monitoring, battery and belt |
| | Tubing: Fit one end into PAPR housing unit and one end into helmet / shroud, click in place. |
| | Medical signs / symptoms: Respirator use may cause increased physiological stress on heart and lungs. This is why a medical exam is needed prior to use. If you experience any problem, stop use and leave area. Inform your supervisor. |
| BATTERY | Make sure battery has full charge. Low battery audible or light on last 20%. Snap onto belt or place end of battery into PAPR housing, click in place. |
| AIRFLOW | Place airflow tube into breath tube, turn unit on. Ball should be above indicator line for max airflow use. DO NOT USE with minimum airflow. Test by blocking tube 1) on/off turns red, 2) particulate light turns red, 3) and / or audible alarm sounds |
| | On some PAPR units, airflow circulation 1x normal use, 2x max boost, 3x returns to normal use |
| CARTRIDGES | Cartridges are designed for specific contaminants. The cartridges are selected according to the particular substance that will be used. Consult OSEH if substance use changes to ensure that the proper cartridge is used. |
| | Gas/Vapor cartridges should be changed out every 6 months (at a minimum), or anytime odor has been detected. For cartridges with an end-of-service- life (ESLI), e.g. mercury, replace the cartridge when indicated by the color change. HEPA filters should be changed out once breathing resistance increases or if the filters become wet. Red light on filter change out. Do NOT blow out filter for extended use. Replace filter in sequence: spark arrestor, pre-filter, then main cartridge. Mixing sequence reduces effectiveness. OK to clean spark arrestor (check owner manual). |
| | Press latch on housing, fit cartridge in, then click in place. Cartridge may have spark arrestor, pre-filter then primary cartage. On other PAPR units, screw 3 cartridges onto PAPR housing unit |
| STORAGE | Store where unit is accessible for use. Do not subject unit to extreme temperatures. Keep helmet clean (check owner manual). Do NOT immerse PAPR battery housing into water. Do not store PAPR in contaminated area. |
| CLEANING | See owner manual. Disinfect hood /shroud, remove cartridge prior to cleaning. |
| INFORMATION | How improper fit, usage, or maintenance can compromise the protection provided by the PAPR. Conduct pre-checks for each use of PAPR. Reason for annual fit test training. |