Powered Air Purifying Respirators

P A P R
What is a PAPR?

- The equipment is battery operated, consists of a half or full facepiece or hood, breathing tube, battery-operated blower, and particulate filters (HEPA only).

- A PAPR uses a blower to pass contaminated air through a HEPA filter, which removes the contaminant and supplies purified air to a facepiece or hood.

- A PAPR is not a true positive-pressure device because it can be over-breathed when inhaling.
**PAPR overview:**

- **Full Barrier Personal Protective Equipments (PPE) with Powered Air Purifying Respirator (PAPR)**

- **Employees must be instructed how to put on, position, adjust, and remove respirators.**

- **Part of a Respiratory Protection Program**
  - OSHA 1910.134 (c)

- **Before PAPR use, medical evaluation is required.**
  - OSHA 1910.134 (c) (1) (iii)
  - Use of PAPRs, with loose fitting hood, does not require fit testing with exceptions*. 

*Technical details or specific exceptions may need to be referred to the OSHA standards for complete compliance guidance.*
Powered Air Purifying Respirators are the ONLY devices that provide protection against ALL hazards (almost) and threats--CBRN, pandemic influenza, H1N1, H5N7, and all surgical and non-surgical healthcare environments--while permitting beards, facial hair, long hair, eyeglasses, and never requiring test-fitting (currently).

OSHA requires NIOSH certification
Types of PAPRs

- **Hood and head cover with face shield.**

- **Loose fitted hood.**

- **Full facepiece**
  - *Note: requires if testing*
Filters

- OHSA says:
  
  Identification of filters, cartridges and canisters. The employer shall ensure that all filters, cartridges and canisters used in the workplace are labeled and color coded with the NIOSH approved label and that the label is not removed and remains legible.
Filters types

- Filter nomenclature:
  - HEPA = High-efficiency particulate air
  - Resistance to oil:
    - N = non resistant, R = resistant and P = Strong resistance
  - Efficiency
    - 95% - 99% - 100%
  - Example:
    - N95 = not resistant to oil, 95% efficient
Putting it all together

**Assigned Protection Factor (APF) means the workplace** level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program as specified by this section.

In comparison to

- **Loose-Fitting Powered Air-Purifying Respirator (PAPR)**
  - APF = 25

- **Hooded Powered Air-Purifying Respirator (PAPR)**
  - APF = 25

- **Full Facepiece Self-Contained Breathing Apparatus (SCBA)**
  - Pressure demand mode is  APF = 10,000
  - Needs to be fit tested
Applications for the use of PAPRs in healthcare settings

- Infectious disease control:
  - SARS, Tuberculosis, MRSA, Influenza, H1N1, etc.
- Laboratories
- Hazardous Materials - Decontamination
The PRO’s of PAPR’s

- First and foremost:
  - No fit testing requirement (for loose hood) this is a very desirable feature for use in a health care environment.
  - Can be worn with eyeglasses / beard
- Simple to use.
- Does not exert much of a physical demand on user.
The CON’s of PAPR’s

- Battery powered
  - Battery life / charging / storage / maintenance
- Hoods
  - Vision clarity / Storage
    - Soft facepiece creases when stored
- Not for use in IDLH environment (19.5 % oxygen)
  - i.e. smoke….confined space…etc
- Compatibility - limited to filters ???
The CON’s of PAPR’s continued

- **Cost**
  - Average cost $1,000.00

- **Amount of PAPRS needed for specific mission**
  - 500 medical staff as opposed to 25 to 50 for a mission specific operation (cohorting patients)
Building a better PAPR

- **Battery powered**
  - Fuel gauge: show charge level
  - Audible alarm when battery reaches 20%
- **Hoods**
  - Vision clarity: polycarbonate facepiece
  - Rigid construction
- **Flow meter**
  - 6 CFM to hood
  - Alarm when drops below 6 CFM
Building a better PAPR

Continued

- Decon-ability
  - Waterproof belts / straps
- Filters
  - Covers to allow for use in wet condition (decon shower)
Building a better PAPR

Continued

- Concept for Weapons of Mass Destruction (WMD) Capable Powered, Air-Purifying Respirator (PAPR)
  
  (NPPTL)

  - Outlines some of these ideas.

  - **Low Battery Indicator:** Each PAPR must contain an indicator to show the state of charge of the battery

  - **Low Flow Indicator:** Each WMD Capable PAPR shall have an indicator to alert the user when the airflow in the breathing zone reaches the applicant’s identified acceptable minimum flow for the respirator to maintain positive pressure in the breathing zone.
Building a better PAPR

Continued

- **Cost effective:** Healthcare organizations have a substantial investment in current PAPR’s. Especially in a Decon setting

  - PAPR vs N-95 vs Surgical mask
    - Better price point for more mission specific PAPR designed for healthcare use. Decrease testing therefore decreasing price

- Testing in accordance to intended use. i.e. bio-hazards (ID) as opposed to chemical ( hazmat )
References

- OSHA 29 CFR 1910.134
- OSHA Technical Manual (OTM) Section VIII: Chapter 2
- Assigned Protection Factors for the Revised Respiratory Protection Standard
- NIOSH Guide to the Selection and Use of Particulate Respirators
  - http://www.cdc.gov/niosh/docs/96-101/[
- OSHA Best Practices for HOSPITAL-BASED FIRST RECEIVERS OF VICTIMS from Mass Casualty Incidents Involving the Release of Hazardous Substances
References

- Concept for Weapons of Mass Destruction (WMD) Capable Powered, Air-Purifying Respirator (PAPR)