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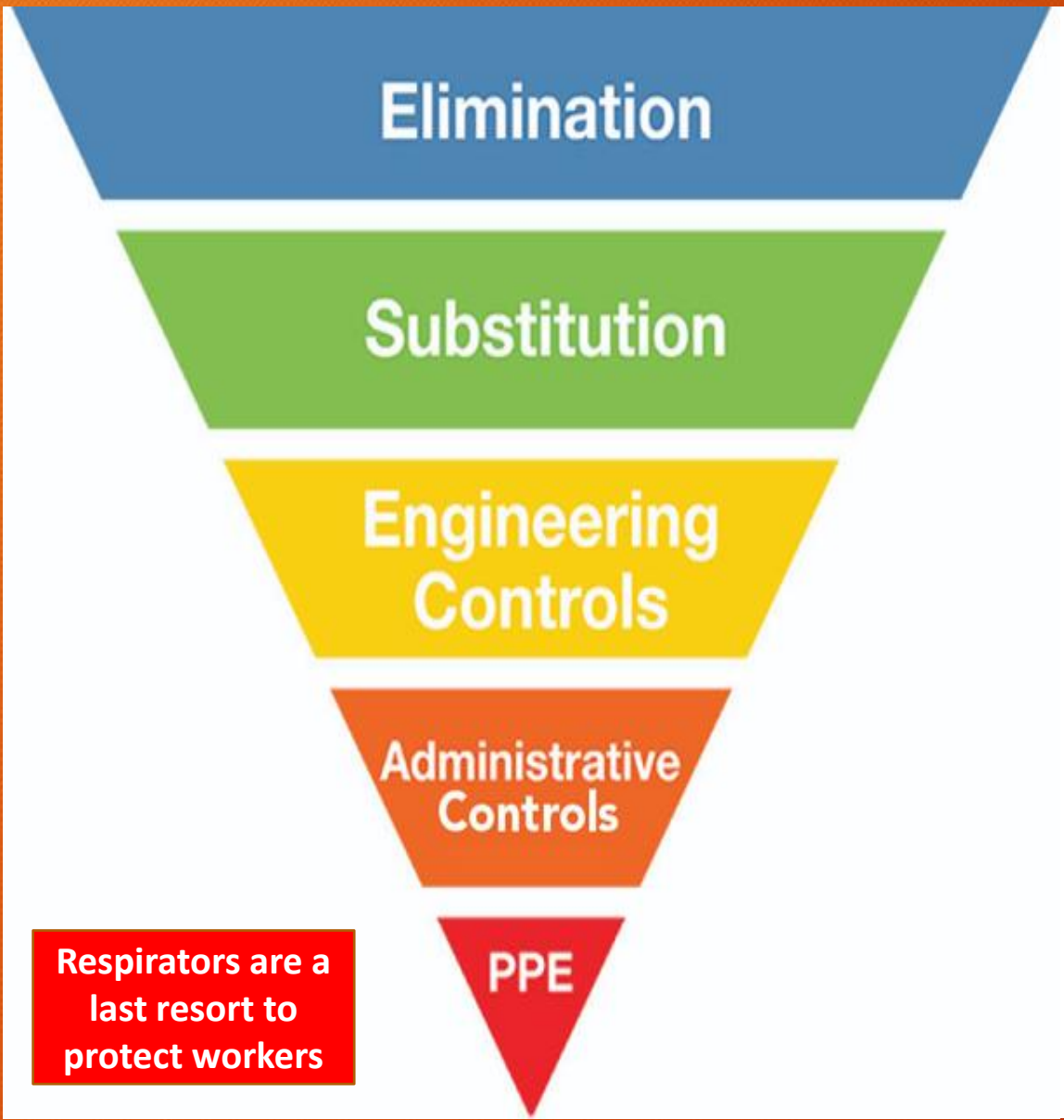
Selecting Respirators and Associated Equipment

From the April 26, 2018 Webinar- Respiratory Protection and Medical Surveillance for Silica?

OSHA's Hierarchy of Controls



Remember-

OSHA expects employers to use all other methods of controlling contaminants before requiring use of Personal Protective Equipment (PPE).

OSHA considers respirators (a form of PPE) to be a last resort for worker protection from hazards and exposures.

Everything is based on your sampling results!

You must review your Safety Data Sheets, know what contaminants may be present in the work area, and have conducted sampling for those contaminants.

When your lab results come back you must compare the results to the OSHA Permissible Exposure Limits (PEL).

Until you can lower the level of contaminants in the work area, Respiratory Protection must be provided to employees for any contaminants over the PEL.

You must share sampling results with affected employees within 15 days of receiving the report from the lab or your consultant.

Everything is based on your sampling results!

BUY RESPIRATORS TO COVER THE NEEDS FOR JOB EXPOSURES:

1. Reliably under the Action Level (< 25 µg/m³), so no respirator required
2. Over the Action Level but below the PEL (≥25 µg/m³ but less than 50 µg/m³)
3. Over the PEL (50 µg/m³)
   a. Less than 10 times the PEL (TWA is <500 µg/m³)
   b. Over 10 times the PEL (TWA is >500 µg/m³)
4. Unknown contaminants or above the Immediately Dangerous to Life and Health (IDLH) concentrations

Tip:

Exposure levels go with the job, not the person. All employees sharing the same job duties, are in the same exposure group.

Respiratory Equipment Selection

Your First Decision-Is Use Required or Voluntary?

Required Use

Respirators must be used because there is a **hazardous** atmosphere present

The chemical (dust, fume, gas, vapor or mist) exposure exceeds the PEL

OR

The employer requires use even if *no hazard exists*

(there is no overexposure)

Voluntary Use

There is NO hazardous atmosphere present

(there is no overexposure)

AND

The employer allows employees to wear respirators on a voluntary basis

Filtering or Air-Purifying Respirators

Filtering Facepiece

Disposable dust mask- 2 straps

- Filters contaminants out of the air
- Does require fit testing! Adjustable straps and nose clip at bridge of nose.
- Disposable when breathing is difficult or mask is dirty or malformed

Elastomeric Respirators

Half-mask respirator- Covers only nose and mouth

- Filters dusts, fumes and mists out of the air
- Does require fit testing! Adjustable straps.
- Change out cartridges as needed. Clean and reuse.

Full-face respirator- Covers nose, mouth and protects eyes

- Filters dusts, fumes and mists out of the air
- Does require fit testing! Adjustable straps.
- Only useful for particulates
- Change out cartridges as needed. Clean and reuse.

Atmosphere Supplying or SCBA

Hooded Respirator-

- Protects eyes and face while providing a fresh air source
- Does not require fit testing
- Must have air supplied from tanks or an air line to a fresh air source
- Appropriate for a wide array of chemicals and concentration ranges since it does not filter air but provides an air supply
- Can be fitted with an air chiller for employee comfort

Escape Respirator-

- Usually comes with a limited air supply of 5, 10 or 15-minutes
- Most styles are universal and do not require fit testing
- Appropriate for a wide array of chemicals and concentration ranges since it does not filter air but provides an air supply

Specialty Respirators

Powered Air Purifying Respirator (PAPR)

- Battery operated equipment with a battery, breathing tube, and blower that pushes air through a HEPA filter, making it easier for the wearer to breath through the filter media
- Can be used with a half or full face mask or with a hood. Fit Testing depends upon the style chosen.
- Is NOT considered a positive pressure device because it can be over-breathed when inhaling.

Positive Pressure Respirator- Used in most toxic environments

- Can come in many styles but there is always positive pressure behind the mask
- If there is leakage, it is from inside the mask to the outside
- Positive pressure respirators are required in environments with unknown contaminants, IDLH concentrations, or concentrations higher than 10 times the PEL

Respirator or Cartridge Selection

- Only NIOSH certified respirators may be used.
- Filters come with a letter and a number rating such as N95 or P100

Filter Type	Effectiveness
N	Not oil resistant (least expensive and most common)
R	Resistant to Oil (rarely used)
P	Oil Proof

Filter #	Effectiveness
95	Filters at least 95% of airborne particulates 0.3 microns or larger Usually cooler and easier to breathe through than a 100.
99	Filters at least 99% of airborne particles 0.3 microns or larger
100	Filters at least 99.97% of airborne particulates 0.3 microns or larger Most effective but can make breathing more difficult.

Cartridge Selection

Considerations when choosing filtering cartridges:

1. You cannot use filtering cartridges in an environment with insufficient oxygen. (<21% oxygen) They only filter the air but do nothing to provide oxygen!
2. Cartridges, respirators and all equipment in a respirator system must be from the same manufacturer. Ex. Don't mix a 3M respirator with a MSA cartridge.
3. Two cartridges may be used on a mask at one time or a chemical cartridge may be used with a particulate pre-filter.

At the right you see a black organic vapor cartridge and An N95 particulate pre-filter.

Cartridge Selection for Chemical Filtering

Considerations when choosing filtering cartridges:

Cartridges, regardless of manufacturer, are color coded.

If everyone on the job is wearing the same color cartridge, but yours is a different color, STOP. There is a problem. Leave the area and determine which cartridge color (type) is the correct choice for the contaminants present.

Cartridge Selection

Regardless of the manufacturer, cartridges are color-coded for the type of contaminant they are to filter out. Some common colors are:

Color	
Black	Organic Vapors
Chartreuse	Formaldehyde
Magenta Pink	Radioactive and particulates (Dust, fumes, fogs, smoke, gas, vapor) w/ exceptions
Orange	Mercury vapor
Blue	Carbon Monoxide
Green	Ammonia, or ammonia with acid gases or methylamine
White	Hydrogen chloride, sulfur dioxide, hydrogen sulfide

Tips for Fit Testing & Respirator Style

- If fit testing is done off-site, send employees with a variety of respirator sizes, shaving cream and a razor. Even one-day of growth will affect the respirator seal to the face.
- If employees want to have facial hair, and company policy allows it, you'll have to provide a hooded respirator that does not require a close fit or a fit test.
- Some employee don't like working in hoods. When they turn their head, they loose partial vision and see only the inside of the hood. It is difficult to use with jobs requiring bending and stooping, such as painting.
- Develop a tracking system to ensure that every employee gets a fit test every 365 days.
- Fit test records must include the make, model and size of the respirator used during the test.

Selecting Respirators for Silica Exposure

- Since silica is a dust, respirators must offer protection for particle exposures (filter out particulates)
- Many options can meet the requirements:
  - Air purifying styles with filters
    - Disposable filtering facepiece (FFP) styles (Dust masks)
    - Elastomeric facepiece (1/2 mask or full mask)
    - Powered air purifying- A fan to make breathing easier
      - Tight fitting facepiece & loose fitting hood styles
  - Air supplied styles
    - Tight fitting facepiece & loose fitting hood styles
    - With tanked air or an air line from a fresh air source

Hooded Supplied Air Respirators

- Advantages- no fit testing needed, cool air can be provided and the hood protects eyes
- Make sure air intake is located so it does not suck in contaminants
- Oil lubricated compressors **must** have a carbon monoxide (CO) and/or high temp alarm
  - Non-oil lubricated units still must meet the Grade D CO requirements
  - Alarms must be able to be heard or seen by employees
- In-line filters must be maintained/changed & date tagged
- The air must meet Grade D Breathing Air standards
  - Requires CO, CO_2, moisture content, odor, oil mist monitoring
  - Test kits available from vendors and analytical labs
- Be careful about replacing hoses and other components of breathing air systems- NIOSH certification & matched vendor applies to the ***entire*** "system" including the hose!

Respiratory Equipment

There is a wide array of equipment to make respiratory use easier and more comfortable.

Some examples include:

Airline Cooling Systems

Breathing Air Cylinder Cart

Airline filtration and CO monitoring kit

Respirator Dispenser

Respirator Cleaning Kit

Questions???

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