Personal Protective Equipment: 
Respirator Usage and Safety

During an animal health emergency, exposure to airborne hazards, such as zoonotic disease agents or chemicals, may occur. A number of different respirators are available and when used correctly can provide various levels of protection.

Respirators

➢ A personal protective device worn on the face. It covers the nose and mouth and is specifically designed to provide respiratory protection by forming a tight seal against the wearer’s skin.

➢ Respirators vary in their level of protection and efficiency to filter out airborne particles such as dust, pathogens, gases, or vapors, or chemical splash.

Classification of Respirators

➢ Air-Purifying Respirators
  • Removes contaminants from the air
  • Particulate respirators
    - Particulate Filtering Facepiece (N95s)
    - Elastic Respirators
    - Powered Air-Purifying Respirators (PAPRs)
  • “Gas mask” respirators

➢ Air-Supplying Respirators
  • Provides clean source of air
    - Supplied air respirators (SAR)
    - Self-contained breathing apparatus (SCBA)

➢ OSHA Videos on Respirator Types
  • https://www.osha.gov/video/respiratory_protection/resptypes.html

NIOSH Particulate Filter Categories

<table>
<thead>
<tr>
<th>Minimum Filter Efficiency</th>
<th>N series Not resistant to oil</th>
<th>R Series Somewhat resistant to oil</th>
<th>P Series Strongly resistant to oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>95%</td>
<td>N95</td>
<td>R95</td>
<td>P95</td>
</tr>
<tr>
<td>99%</td>
<td>N99</td>
<td>R99</td>
<td>P99</td>
</tr>
<tr>
<td>100% (99.97%)</td>
<td>N100</td>
<td>R100</td>
<td>P100 (~HEPA)</td>
</tr>
</tbody>
</table>

Selecting a Respirator

➢ Type of hazards
  • Particulate vs. gasses or vapors

➢ Identity and concentration of the contaminant

➢ Level of protection provided by respirator

➢ Activity of the person wearing the respirator

Standards and Regulations

➢ OSHA - Occupational Safety and Health Administration
  • 29 Code of Federal Regulations. Part 1910 – Occupational Safety and Health Standards
  • Part 1910.134: Respiratory Protection
  • http://www.osha.gov

➢ NIOSH - National Institute for Occupational Safety and Health
  • http://KnowIts.NIOSH.gov

Proper Use of Respirators

➢ Fit-testing
  • To determine the make, model, and size of respirator that fits; uses qualitative or quantitative check
  • Video about fit testing https://www.osha.gov/SLTC/respiratoryprotection/training_videos.html

➢ Seal check
  • To ensure adequate seal is achieved each time the respirator is put on; uses positive and negative pressure checks
  • Video about seal checking http://www.youtube.com/watch?v=Tzpz5fko-fg

➢ Training
  • Proper donning and doffing
  • Video about training requirements https://www.osha.gov/video/respiratory_protection/training.html

➢ Medical evaluation
  • Personal health questions and medications
  • Work conditions
  • Video about medical evaluations https://www.osha.gov/video/respiratory_protection/medevaluations.html

Just-In-Time training materials can be found at http://www.cfsph.iastate.edu/Emergency-Response/just-in-time-training.php
Exterior Markings of NIOSH-Approved Filtering Facepiece Respirators (diagram)

1. **NIOSH TC** (Testing and Certification) Approval Number. Here the example is TC-84A-xxxx. All NIOSH approval numbers begin with the letters TC.
2. **Brand name, registered trademark**, or an easily understood abbreviation
3. **NIOSH name** in block letters or a NIOSH logo
4. **Filter Class** (N, P, or R) and Filter Efficiency Level (95, 99, or 100)
5. **Lot Number** - recommended but not required
6. **Model Number**

**Health Effects When Wearing Respirators**

- Increased resistance to breathing
- Reduced endurance
- Reduced visual field
- Increased risk for heat stress
- Decreased voice clarity/loudness
- Decreased hearing ability
- Discomfort or irritation
- Psychological stress

**Safe Respirator Usage**

- **Do not use a respirator unless formally trained and fit tested**
- **Select the correct respirator for the job**
  - Particulate filter will not protect against gases/vapors
- **Inspect the respirator before each use**
- **Ensure the face seal**
  - Shave any facial hair
  - Prevent hair or eyeglasses from interfering
- **Do not wear contact lenses with a respirator**

**Before Usage**

- **Inspect all parts of the respirator before use**
  - The facepiece, head straps, valves, tubes, hoses, and any cartridges, canisters or filters
  - Check parts for pliability or deterioration
- **Check that batteries are charged**
- **Ensure proper air flow**
- **Do NOT use the respirator if it is not working properly!**

During Usage

➤ Immediately leave contaminated area if the respirator stops working

➤ Immediately leave contaminated area if you feel nauseous, dizzy or ill, or have difficulty breathing
   • Return to fresh air and remove the respirator
   • Never remove a respirator in contaminated area

➤ Once in a safe area, check if the canister, cartridge, or filter
   • Replace if user notices an odor, taste, or throat irritation
   • Replace any wet, damaged, and grossly contaminated cartridges/canisters

➤ If using battery operated respirators (PAPRs),
   • Do not work in contaminated conditions longer than the battery will last
   • Check the battery periodically to make sure enough power is left to finish the job
   • If not, stop and get a fully charged battery from a safe area.

➤ If using SCBA respirators,
   • Only work as long as the air supply will last
   • Do not try to test the limit
   • When the air supply is getting low, return to a safe area for a full tank

Cleaning

➤ Follow manufacturer’s cleaning guidelines

➤ Warm water/mild detergent

➤ Disinfectant solution

➤ Rinse thoroughly

➤ Dry thoroughly

➤ Never soak entire unit in detergent

➤ Do not use solvents

Respirator Storage

➤ Store in accordance with manufacturer’s instructions

➤ Check expiration dates

➤ Never use and discard if:
   • Color changes
   • Shrinking
   • Wearing/thinning of material
   • Stretching
   • Cuts/tears/holes

Additional Resources

➤ National Institute for Occupational Safety and Health (NIOSH) – Respirators
   http://www.cdc.gov/niosh/topics/respirators/

➤ Occupational Safety and Health Administration (OSHA) – Respiratory Protection
   https://www.osha.gov/SLTC/respiratoryprotection/

➤ OSHA Respirator Training Videos
   https://www.osha.gov/SLTC/respiratoryprotection/training_videos.html#video

➤ U.S. Food and Drug Administration (FDA) – Masks and N95 Respirators
   http://www.fda.gov/medicaldevices/productsandmedicalprocedures/generalhospitaldevicesandsupplies/personalprotectiveequipment/ucm055977.htm

➤ U.S. Department of Agriculture – Foreign Animal Disease Preparedness and Response Plan (FAD PReP) NAHEMS Guidelines: Personal Protective Equipment

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