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## LOYOLA UNIVERSITY CHICAGO GUIDELINES FOR THE USE OF A RESPIRATOR

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**PURPOSE:** This document provides guidance for use of a respirator.

**REGULATORY:**

Occupational Safety and Health Administration (OSHA) Respiratory Standard

29 CFR 1910.134 - Respiratory protection

29 CFR 1910.134 – Appendix A - Fit Testing Procedures (Mandatory)

29 CFR 1910.134 – Appendix B-1 - User Seal Check Procedures (Mandatory)

29 CFR 1910.134 – Appendix B-2 - Respirator Cleaning Procedures (Mandatory)

29 CFR 1910.134 – Appendix C - OSHA Respirator Medical Evaluation Questionnaire  
(Mandatory)

29 CFR 1910.134 – Appendix D - Information for Employees Using Respirators When Not  
Required Under the Standard (Mandatory)

**RESPIRATOR DEFINITION:**

A respirator is a device to protect you from inhaling dangerous substances such as harmful dusts, fogs, fumes, mists, gases, smokes, sprays, vapors, or infectious particles.

**GENERAL INFORMATION**

Loyola University Chicago has a written Respiratory Protection Program, per the OSHA Respiratory Standard (29 CFR 1910.134), which applies to employees who are required to wear respirators during normal work operations, as well as employees who voluntarily wear a respirator when a respirator is not required.

The National Institute for Occupational Safety and Health (NIOSH), part of the Centers for Disease Control and Prevention (CDC) in the U.S. Department of Health and Human Services, tests and certifies respirators for use by workers to protect against workplace hazards. Respirators certified by NIOSH will say “NIOSH Approved” and may have a certification number. However, NIOSH only certifies respirators against specific hazards. A respirator being certified does not mean it will protect against all hazards. NIOSH-certified respirators are supplied with approval labels that identify the hazards that the respirator is approved to protect against. Only NIOSH approved and certified respirators are allowed for use at Loyola facilities.

**Types of Respirators and Cartridges (Filters):**

**Disposable Paper Dust Mask**

A dust mask is a flexible paper pad held over the nose and mouth by elastic or rubber straps for personal comfort against non-toxic nuisance dusts. They are not intended to provide protection from toxic airborne hazards and are not covered under the Loyola University Chicago Respiratory Program.

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### **Disposable Paper Dust Mask**

#### **Filtering Facepiece Respirator (FFR)**

- Disposable
- Covers the nose and mouth
- Filters out particles such as dust, as well as certain types of mist, and fumes
- Select from N, R, P series and 95, 99, 100 efficiency level
- Does not provide protection against gasses and vapors
- Fit testing required

#### **Air Purifying Respirator (APR)**

APRs work by removing gases, particles, vapors, aerosols (droplets and solid particles), or a combination of these contaminants from the air using filters, cartridges, or canisters. These respirators do not supply oxygen and therefore cannot be used in an atmosphere that is oxygen-deficient (<19.5% oxygen) or any atmosphere that is classified as immediately dangerous to life or health (IDLH). IDLH means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere. The appropriate respirator for a particular situation will depend on the environmental contaminant(s) and their concentrations.

#### **Elastomeric Half Face Air Purifying Respirator**

##### **Particulate Cartridges**

Particulate respirators only protect against particles. They do not protect against liquid chemicals, gases, or vapors, and are intended only for low level hazards. Particulate respirators are classified as "air-purifying respirators" because they clean particles out of the air as you breathe.

##### **HEPA Filter**

HEPA is an acronym for "high efficiency particulate air [filter]." This type of air filter can theoretically remove at least 99.97% of dust, pollen, mold, bacteria, and any airborne particles with a size of 0.3 microns ( $\mu\text{m}$ ). Particulate filter types are the N100, R100, and P100 filters. Filters with an N designation are not resistant to oil. Filters with an R designation are somewhat resistant to oil. Filters with an P designation are strongly resistant to oil.

##### **Organic Vapor Cartridge Filter**

Organic vapor is the term for the gaseous phase of an organic material, or a mixture of organic materials present in the atmosphere. Organic vapors are often derived from organic solvents, which are carbon-based substances which can dissolve or disperse other substances. Products like turpentine, gasoline, paint thinner, urethanes and solvent based epoxy all will give off organic vapors in varying amounts.

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Organic vapor respirator cartridges are filled with a material called activated carbon. Activated carbon is typically made from coal or renewable resources like wood or coconut shells. It is “activated” by heating the material in nitrogen or steam at approximate temperatures of 800 - 900 °C. The resulting material has a significant number of micropores that help adsorb various organic vapors.

When organic vapors are drawn through an organic vapor cartridge, the air is filtered as vapors condense into the carbon pores. Vapors move through the cartridge from one pore to the next. This occurs more quickly for small volatile vapors with lower boiling points (e.g., acetone). Some migration of organic vapors can even occur during storage, so care must be taken before reusing the cartridge.

The effective service life is the time until vapors begin to exit the cartridge. Unlike particle filters, service life is not indicated by change in breathing resistance. Instead, cartridges must be changed according to end-of-service-life indicator, or the taste, smell, or irritation from the contaminant whichever comes first.

Activated carbon by itself cannot adsorb other types of gases or vapors such as acid gases, ammonia, formaldehyde, etc. In some cases, additional metals and salts are added to the carbon to selectively remove these compounds.

**See Appendix A for the proper technique for donning an Elastomeric Half-Face Air-Purifying Respirator**

### **When does a cartridge (filter) need to be changed?**

Change cartridges and filters as necessary. If you experience an increased resistance in breathing while using a particulate cartridge or when you detect contaminant odors or taste or experience irritation in your eyes, nose, or throat while wearing your respirator with any type of cartridge. Cartridges/filters may be disposed of in the general trash.

### **General guidance for organic vapor cartridges.**

Workers who use respirators intermittently, especially those working in a variety of environments, should never reuse organic vapor cartridges after one shift. This is due to chemical desorption of the vapors/gasses and their migration through the cartridge charcoal bed. When this occurs, contaminants could be inhaled by the respirator wearer upon initial donning and the concentration could even be higher than contaminant concentrations found in the ambient workplace atmosphere.

### **Factors That Influence the Service Life of a Cartridge**

Exposure concentration, temperature, breathing rate, exposure to multiple contaminants, or humid conditions will shorten the service life of a cartridge. Any alterations or modifications, including painting, affixing labels or using unapproved replacement parts can reduce protection and exposes the employee to the risk of illness, injury or death.

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### Medical Evaluation

Employees who are either required to wear respirators or who choose to wear an APR, voluntarily must pass a medical exam by a physician or other licensed health care provider before being permitted to wear a respirator on the job. Employees are not permitted to wear respirators until a physician or other licensed health care provider has determined that they are medically able to do so. An employee refusing the medical evaluation will not be allowed to work in an area requiring respirator use or to perform any task where an employee feels a mask is necessary.

### Why can't a respirator be worn?

- The employee does not have clearance from a licensed health care provider.
- The employee has any facial hair, which will not allow for a complete seal from the face to the respirator
- The employee has a medical condition, such as asthma or emphysema
- The employee is unable to complete/pass the fit test

### Fit Testing

Fit testing is required for employees wearing half-facepiece APRs. Employees voluntarily wearing half-facepiece APRs must also be fit tested by a competent person and/or a physician or other licensed healthcare provider.

Employees who are required to wear a tight-fitting respirator facepiece shall be fit tested:

- Prior to being allowed to use that type of respirator.
- Annually
- When there are changes in the employee's physical condition that could affect respiratory fit (ie: obvious change in body weight, facial scarring, dental work, etc.).
- When an employee receives a new respirator.

Employees will be fit tested with the respirator that they will actually wear and which provides an appropriate fit. The competent person will conduct fit tests following applicable OSHA regulations. It is the staff member's responsibility to inform their Supervisor if a new respirator or additional cartridges/filters are necessary. Additionally, an employee shall ensure the following:

- Be clean-shaven; no stubble, sideburns, or beard that could interfere with seal.
- Not wearing jewelry or facial makeup that may interfere with face-to-facepiece seal.
- If an employee wears corrective glasses or goggles or other personal protective equipment, the employer shall ensure that such equipment is worn in a manner that does not interfere with the seal of the facepiece to the face of the user.

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### Qualitative Fit Testing

While conducting the qualitative fit testing, the competent person will utilize OSHA approved methods while having the employee perform the following tasks: The approved OSHA methods include Isoamyl Acetate Protocol, Saccharin Solution Aerosol Protocol, Bitrex™ (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol and Irritant Smoke (Stannic Chloride) Protocol. (See 29 CFR 1910.134 Appendix A)

- Deep breathing: standing position without talking, breathing, slowly and deeply.
- Turning head side-to-side: standing position, slowly turning head side-to-side, holding at an extreme point and inhaling.
- Moving head up and down: standing position, slowly moving head up and down and inhaling in the up position.
- Talking: reading of the “Rainbow Passage”( See OSHA 29 CFR 1910.134 Appendix A, Part 1, A, 14(a) 5).
- Bending over/jogging in place
- Normal breathing: standing position without talking

### Quantitative Fit Testing

This process is another type of fit testing methodology where the employee is attached to a computer instead of the reagents used for qualitative fit testing and performing the same tasks as those outlined in the qualitative fit testing section.

### Positive and Negative Pressure Seal Checks

An employee must conduct positive and negative pressure seal checks every time a respirator is utilized to ensure a proper fit/seal.

### Negative Pressure Fit Check

1. Put on the respirator and adjust it so it's snug, but not overly tight.
2. Using the palm of your hand, block the air inlet, usually found on the sides of the facepiece.
3. Gently breathe in so the facepiece collapses slightly and hold your breath for 10 seconds.

The facepiece should remain slightly collapsed while you hold your breath, this indicates that there is no inward leakage of air and the respirator has sufficiently sealed for use.

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### Positive Pressure Check

1. Don the facepiece and adjust so it's snug, but not overly tight.
2. Using the palm of your hand, block the exhalation valve, usually found on the bottom of the respirator.
3. Gently breathe out, which should allow the facepiece to puff out slightly.

If a slight amount of positive pressure is able to build up inside the facepiece without any evidence of it leaking outward, the respirator is considered satisfactory to use.

**See Appendix B for additional information.**

### Care and Maintenance of the Respirator

The respirator must be inspected every time prior to being worn, after it has been worn, and during cleaning. Respirators that fail an inspection must be immediately removed from service and replaced.

#### Facepiece

- Ensure that no holes or tears are present.
- Inspect for cracked and missing gaskets.
- Make sure the facepiece edges are pliable and are not rippled or distorted.

#### Head strap/harness

- Check webbing or straps for breaks.
- Check for broken, missing, or non-functioning buckles.
- Look for deterioration of elasticity or fraying edges.
- Test excessively worn head harness.

#### Inhalation and exhalation valves

- Ensure the valve and valve seat are free of dust particles or dirt that may cause a poor seal or reduce efficiency.
- Make sure that there are no cracks or tears in the valve material.
- Replace any missing or defective valve covers.

#### Filter elements

- Ensure that the filter and mask are certified for use together.
- Check the filter to see that it is approved for the hazard and will protect the wearer at the concentration they will be exposed to.
  
- Inspect both the filter threads and facepiece threads for wear, make sure they are screwed together properly, and there is no cross threading.
- Check the filter housing for cracks or dents.

**See Appendix C for an illustration of the parts of an Elastomeric Half-Face Air-Purifying Respirator**

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### Repair

Repair of respirators may be done only by experienced personnel with parts designed for the specific respirator needing repair. Parts from different respirators and manufacturers must never be mixed. No attempt may be made to replace parts or to make the adjustments or repairs beyond the manufacturer's recommendations.

### Cleaning and Storage

- Follow the manufacturer's instructions.
- Do not clean with solvents.
- Clean and disinfect respirators after each use.
- Respirators may be cleaned with non-alcohol-containing wipes prior to each use.
- Remove filters or cartridges and store them in a bag separate from the respirator to prevent cross contamination.
- Disassemble the respirator and wash with a mild dish detergent or a combination of detergent and disinfectant using a soft brush and warm water.
- Rinse with clean water or rinse once with a disinfectant and once with clean water. The clean water rinse removes excess detergent or disinfectant that can cause skin irritation or dermatitis.
  
- Dry on a rack or clean surface. Position the respirator on its face so that the facepiece rubber will not "set" crookedly as it dries.
  
- After cleaning the respirator at the end of each shift, store the respirator in the bag it comes in to protect it from dust, sunlight, heat, extreme cold, excessive moisture, and chemicals.
  
- Do not store items on top of respirators, which could deform the face piece shape
  
- Do not hang the respirator by the straps to dry or for storage. This will weaken the straps and shorten their life.

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**APPENDIX A**

**How to put on an Elastomeric Half-Face Air-Purifying Respirator**

Place the respirator over your nose and mouth with the bottom straps unfastened.



Pull the top strap over your head, placing the head cradle on the crown of your head.



Hook the bottom straps together behind your neck.



Adjust strap tension to achieve a secure fit. Pull the ends of the straps to adjust the tightness beginning with the adjustment points at the top of the respirator and then moving to the adjustment points at the back of the neck. The respirator should fit your face snugly. Do not overtighten. Strap tension may be decreased by pushing out on back side of buckles. When adjusting straps always pull the straps straight back, not out to the side.





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### APPENDIX B

Proper Position for a Negative  
Pressure Fit Check



Proper Position for a Positive  
Pressure Fit Check



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**APPEXDIX C**

The basic parts of a typical elastomeric half-face air-purifying respirator

NOTE: Both sides of the respirator would use the same type of filter or cartridge

