

# The air you breathe



*Oregon OSHA's respiratory protection guide for agricultural employers*

## About this guide

“**The air you breathe**” is an Oregon OSHA Standards and Technical Resources publication. Thanks to Peggy Munsell, Trena Vandehey, Lori Cohen, Trudi Tyler, Garnet Cooke, and Erick Banks for advice and technical help.

Thanks to Garnet Cooke for demonstrating how to perform a fit test and seal check, and to Kiki Hammond, DCBS Communications, for photographing the fit test process, pages 10-11.

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**Topic categories:** *agriculture, respiratory protection*



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# Introduction

Our lungs aren't invincible. With repeated overexposure to toxins, the protective barriers that keep our lungs healthy break down. We may not even be aware of the symptoms — a persistent cough or shortness of breath — until the damage is permanent. Consider the health risks of long-term smoking, for example: *lung cancer and emphysema*.

Workers are also at risk when they breathe contaminated air. You may know about “farmer’s lung,” an allergic disease caused by breathing the organic dust from moldy crops such as hay, straw, and corn. You may have heard of “black lung,” a respiratory disease that has destroyed the lives of thousands of coal miners.

Did you know that agricultural workers may be exposed to many other hazards that can cause respiratory problems? Air contaminated with pesticides or chemicals, for example. Or toxic gasses such as nitrogen oxide (in silos) and hydrogen sulfide (near agitated manure pits). And many confined spaces, such as silos and grain storage bins, may not even have enough oxygen to make breathing possible.

In this guide you'll learn what you can do to protect your employees from agricultural respiratory hazards. You'll learn about the basic types of respirators and how to develop an effective respiratory protection program — the main requirement of Oregon OSHA's respiratory protection standard for agriculture, **437-004-1041, Respiratory Protection**.

**User-friendly features.** We want you to learn from our guide and we want you to use it. We've enclosed a DVD that includes a short video about the proper use of respirators and a CD that includes a sample respiratory protection program that you can modify and use as your own.

# 1

## Who might need respiratory protection?

Your employees must wear respirators when they're exposed to air contaminants or work in areas where lack of oxygen could be a problem. What makes a contaminant harmful depends on its toxicity, its physical form, its concentration, and how long employees are exposed.

Your employees might need to wear respirators if they:

- Mix or apply fertilizers and pesticides
- Work with toxic paints or solvents
- Clean grain bins
- Uncap or work in silos
- Work with corn silage
- Handle moldy hay
- Work with certain feeds or fish meal
- Sweep bird or mouse droppings or animal hair

Your employees could develop serious lung diseases or die if they're exposed and they aren't wearing appropriate respirators.

## Sources of common air contaminants

	Confined hog housing	Confined poultry housing	Manure pits	Pesticides	Silage
Ammonia	✓	✓	✓		✓
Carbon dioxide	✓	✓	✓		
Dried fecal particles	✓	✓			
Dried feed products	✓	✓			
Dusts	✓	✓		✓	
Feathers		✓			
Fumes				✓	
Hair and skin particles	✓				
Hydrogen sulfide	✓		✓		
Methane	✓		✓		
Mists				✓	
Mold and spores					✓
Nitrogen					✓
Oxides					✓



## 2

# Developing and managing your respiratory protection program

## *Essential elements of a respiratory protection program*

You can't just hand out respirators and expect your employees to use them properly. If respirators are necessary to protect your employees, you must have a written respiratory protection program that describes how to:

- Choose appropriate respirators.
- Provide medical evaluations for employees who use respirators.
- Fit test employees who use tight-fitting respirators.
- Train employees to use respirators properly and to recognize symptoms of exposure to harmful air contaminants.
- Ensure that respirators are clean and properly maintained.
- Review the program's effectiveness.

## *Who can manage your respiratory protection program?*

Someone — you or one of your employees — who has appropriate training, knowledge, and experience about respirators can manage your program; certification isn't necessary. The program manager can delegate parts of the program, such as respirator fit testing or maintenance, to other qualified employees but must oversee their activities.

### How respirators work

Respirators work in two ways: they purify ambient air with filters, cartridges, or canisters (air-purifying respirators) or supply clean air through a compressor or a compressed-air cylinder (supplied air respirators).

Two types of commonly used air-purifying respirators are dust masks and powered air-purifying respirators (PAPR).



- The most common disposable respirator is the dust mask or filtering facepiece respirator. Use a dust mask for protection against airborne dust during haying, combining, cultivating dusty fields, cleaning dusty barns, or applying lime and fertilizers.

Dust masks don't protect against chemical vapors, gases, toxic pesticide sprays, or lack of oxygen.



- A powered air-purifying respirator has a motorized blower that forces air through the filtering device. A PAPR is a positive pressure respirator because it provides clean air to the user. Another type of PAPR, called a helmet respirator, has a loose-fitting helmet or hood. Use a PAPR for protection against dusts, mists, gases, and vapors — but only with appropriate filters.

Don't use PAPRs in areas that are immediately dangerous to life or health (IDLH).

For information about selecting and using respirators, contact local agricultural stores, safety supply stores, or pesticide sales outlets.

## Choose the right respirator

Before you go out and buy respirators for your employees, you'll need to know something about the air contaminants they're exposed to and whether they're exposed at unsafe levels.

### Determine the following:

- Jobs where a lack of oxygen could be a problem.
- Which contaminants employees may be exposed to during their work or at the job site.
- The types of pesticides employees will use. (*Employees must use the type of respirator specified by the pesticide manufacturer.*)
- How toxic the contaminants are.
- The physical form of the contaminants — dust, mist, spray, gas, vapor, or fume.
- The concentrations of the contaminants.
- How long employees are exposed to the contaminants.

Knowing your employees' exposure levels is also critical to choosing appropriate respirators. You can determine exposure levels by measuring them or by estimating them with data from previous measurements. Examples:


- Measure the exposures of individual employees by sampling their breathing air. The procedure — called personal exposure monitoring — is the most accurate way to measure.
- Sample the air at specific locations — called area monitoring — to estimate exposures affecting groups of employees. This method is useful when employees move about and may not always be near a hazard.
- Use representative exposure data from industry studies, trade associations, or product manufacturers to estimate exposures affecting groups of employees. You must be able to show that the data are based on conditions similar to those where your employees work.

 **A specialist, such as an industrial hygienist, can help you evaluate employee exposures, interpret the results, and suggest how to lower exposures to safe levels.**

 **You can get help from your workers' compensation insurance carrier and Oregon OSHA, or you can hire a private consultant.**

### Where to buy respirators

You can find most types of respirators at safety supply stores. Also check farm supply stores and agricultural chemical suppliers. If these suppliers don't have what you want, they can probably order it for you or tell you how to order it yourself.

 **Only buy NIOSH-certified respirators that show an approval number.**



## ***Provide medical evaluations for employees who use respirators***

Respirators can endanger employees' health, make it harder to breathe, or difficult to fit those who have medical conditions such as asthma, allergies, emphysema, high blood pressure, heart disorder, claustrophobia, or minor facial abnormalities.

You must provide confidential medical evaluations for your employees before they use respirators to ensure that they can wear them without endangering their health.

Employees must have another medical evaluation when their work changes, when a supervisor or the program manager says an evaluation is necessary, or when they show medical symptoms that may affect their ability to use a respirator.

A physician or other licensed health care professional (PLHCP) must do the evaluation at no cost to the employee and you must provide the PLHCP with the following information:

- The type and weight of respirator that the employee will use.
- How long and how often the employee will use the respirator.
- How much physical work the employee will do while using the respirator.
- Other personal protective equipment the employee will use.
- The temperature and humidity of the work environment.
- A copy of your respirator program and a copy of the respiratory protection requirements for agricultural employers (*437-004-1041 Respiratory Protection*).

## ***Fit test employees who use respirators that have tight-fitting facepieces***

Human faces vary in size and shape and so do respirator facepieces. A tight-fitting facepiece must fit so the face-to-facepiece seal doesn't leak.

Before your employees use respirators with tight-fitting facepieces, they must be fit tested to ensure that the facepiece fits properly.

Employees must be fit tested annually and whenever they change facepiece models, styles, or sizes, or if they have a physiological change that affects the face-to-facepiece seal.

The simplest type of fit test is called a qualitative fit test (QLFT). It's inexpensive, easy-to-perform, and relies on the respirator user's response to a test agent such as banana oil or irritant smoke. If the user detects the agent while wearing the respirator, the facepiece doesn't fit properly and the user must be tested with another facepiece.

 For more information, see "How to perform a fit test," Page 10.

### **The medical evaluation questionnaire**

You must also allow employees to complete a medical-evaluation questionnaire at a time and place convenient to them. The PLHCP will use the questionnaire to conduct the evaluation.

Employees must understand the questions. If they don't read or speak English or can't read the questionnaire, they should get help from a friend, family member, or the PLHCP. Because their responses are confidential, *you may not help them* other than to explain the questions.

*You may not read the questionnaire after they answer the questions.*

Employees have the right to discuss the questionnaire and the results of the medical evaluation with the PLHCP.

## ***Train employees to protect themselves from respiratory hazards***

Before your employees can use respirators, they must understand:


- Why respirators are required.
- Why respirators must fit correctly and be properly maintained.
- The capabilities and limitations of respirators.
- How to use respirators in emergencies and how to respond if a respirator fails.
- How to inspect, maintain, and store respirators.
- How to seal-check tight-fitting facepieces.
- How to recognize when a filter cartridge isn't working.
- How and when to change filter cartridges and filters.
- Medical symptoms such as dizziness or shortness of breath that may limit the effectiveness of the respirators.
- The general requirements of your respiratory-protection program.

You can choose the trainer and determine the training format; however, the training content must include the information above.

New employees trained within the past 12 months who can show that they understand the above topics are exempt from initial training.

Retrain employees at least annually (sooner if respiratory hazards change or if employees switch to another type of respirator). You must also retrain employees who don't understand how to use or care for their respirators.

Training is not necessary for those who use respirators voluntarily.

 **If you permit them to do so and their health isn't affected, employees can use respirators voluntarily — i.e., when respirators aren't required by Oregon OSHA. An employee who asks to use a respirator voluntarily must be medically able, must know how to use and maintain it, and must understand the information in 437-004-1041, Appendix D.**

## ***Ensure that respirators are clean and properly maintained***

Employees can clean and maintain their respirators or you can delegate the work to those who have proper training and experience. Whoever has this responsibility should take the following steps:

- Clean and disinfect shared respirators before they're used by another person.
- Inspect respirators for damage before they're used and after they're cleaned. Discard defective respirators or have an appropriately trained person repair them.
- Inspect emergency-use respirators at least monthly and document the inspections.
- Be sure employees store their respirators so that the facepieces and valves are not deformed, in a place free from dust, sunlight, extreme temperatures, and moisture. Self-sealing plastic bags are ideal for storing clean respirators.
- Change filter cartridges and pre-filters according to a change-out schedule based on the hazard the user is exposed to.

## ***Review your program's effectiveness***

Periodically review each part of your respirator program. You don't need to do the review on a fixed schedule — however, it should be performed often enough to keep the program current and effective.

Observing how employees use their respirators and listening to their concerns are also important in evaluating the program. Consider the following:

- Do employees use and maintain their respirators correctly?
- Do their respirators fit?
- Are their respirators appropriate for their work tasks and environments?
- Do they have concerns about the program?
- Evaluate the program elements to ensure they're effective. Update or change them, if necessary.

# 3

## How to perform a fit test

The following is an example of a qualitative fit test (QLFT) that uses irritant smoke as the test agent.

### *Before you begin*

**You'll need the following to perform this test:**

- An irritant smoke kit that includes irritant smoke tubes, aspirator bulb, and a smoke tube opener.
- A variety of facepiece sizes and styles for the employee to choose.
- Respirators that use high efficiency particulate air (HEPA) or P100 series filters.
- A well-ventilated area to perform the test.

### **Step 1: Confirm sensitivity to irritant smoke.**

Squeeze the bulb so that it produces a very small amount of smoke and have the employee breathe it lightly. The smoke should cause the employee to cough.



### **Step 2: Put on the respirator.**

Make sure the employee knows how to put on the respirator, how to position it, and how to set the strap tension without help. There can be no facial hair between the face and seal.

The employee should wear the respirator for at least 5 minutes to ensure that it's comfortable.

### **Step 3: Perform a positive and negative seal check.**

A seal check determines if the facepiece is working properly under positive and negative pressure. The employee must do the following to check positive and negative pressure:

#### **Positive-pressure check**

- I. Block the exhalation valve cover with the palm of your hand.
- II. Exhale gently into the facepiece, creating a slight positive pressure.
- III. If you can feel air leaking under the facepiece, reposition the facepiece and repeat I and II until you have an effective seal.



#### **Negative-pressure check**

- I. Block the inlet openings of the cartridges or canisters with palms or your hands and inhale gently so that the facepiece collapses.
- II. Hold your breath for about 10 seconds. The seal is effective if the facepiece stays collapsed.
- III. If the facepiece expands or you can feel air leaking under the facepiece, reposition it and repeat I and II until you have an effective seal.



## Step 4: Perform the irritant smoke test



### General procedure

The employee's eyes should remain closed during this step so that the smoke doesn't irritate them.

Keeping the smoke tube 12 inches away from the mask, squeeze the bulb every 20 seconds, making three slow passes around the perimeter of the mask.

### Perform this general procedure for each of the following conditions:

- Normal breathing
- Deep breathing
- Head side-to-side
- Head up and down
- Talking
- Bending over
- Normal breathing

Those who detect smoke at any time during Step 4 must reposition or tighten the respirator or select another one and be tested again.

## Step 5: Confirm sensitivity to irritant smoke.

Have the employee remove the respirator.

Repeat step 1.



**Be sure to keep a record of the fit-test results and update it whenever the employee is retested. Include the following information:**

- **Test date**
- **Employee's name**
- **Fit test type (examples: irritant smoke, banana oil)**
- **Make, model style, and size of the respirator(s) tested**
- **Make, model style, and size of the respirator(s) that the employee will use**

## **A respiratory protection checklist for agricultural employers**

- Have an effective, written respiratory protection program managed by a knowledgeable person if respirators are necessary to protect your employees or you require employees to wear them.
- Evaluate the respiratory hazards at your workplace to determine the types of respirators that will protect your employees before you purchase respirators.
- Provide medical evaluations to employees before they use respirators to ensure that they can use respirators safely.
- Fit test employees who use respirators that have tight-fitting facepieces. Employees must be fit tested annually and whenever they change facepiece models, styles, or sizes, or if they have a physiological change that affects the face-to-facepiece seal.
- Keep a record of each employee's fit-test results.
- Ensure that employees clean and disinfect their respirators as often as necessary when used exclusively by one employee and after each use when used by more than one employee.
- Ensure that employees inspect their respirators for defects whenever they use them and clean them.
- Ensure that employees are trained before they use respirators for the first time and annually thereafter. Employees must also be retrained if they don't understand how to use or care for their respirators or if changes in their work makes previous training obsolete.
- Periodically evaluate the program to ensure that it's effective.

# 4

## Rules and terms

### *437-004-1041, Respiratory protection*

Oregon OSHA's respiratory protection standard for agricultural employers.

### *437-004-1041, Appendix A*

Mandatory fit-testing procedures.

### *437-004-1041, Appendix B-1*

Mandatory seal-check procedures.

### *437-004-1041, Appendix B-2*

Mandatory respirator cleaning procedures.

### *437-004-1041, Appendix C*

Mandatory Respirator Medical Evaluation Questionnaire (English and Spanish).

### *437-004-1041, Appendix D*

Information for employees who ask to use respirators voluntarily (English and Spanish).

### **air contaminant**

Particulate matter including dusts, fumes, gasses, mists, smoke, or vapors.

### **ambient**

Within a surrounding area or environment.

### **approval number**

A number that indicates a respirator has been approved by the National Institute for Occupational Safety and Health (NIOSH). Respirators certified by NIOSH include labels that say "NIOSH Approved" and may have an approval number. Always check the label to ensure that the respirator will protect employees from the contaminants that they're exposed to.

### **area monitoring**

Measurement of the level of contaminants within a general area.

### **cartridge/canister**

A respirator component containing a filter, sorbent, or catalyst that removes specific air contaminants.

## **change-out schedule**

A replacement schedule that ensures canisters and cartridges are replaced before the end of their service life. Change-out schedules are required for canisters and cartridges that do not have end-of-service-life indicators (ESLI) certified by the National Institute for Occupational Safety and Health (NIOSH).

## **confined space**

A space that has all of the following characteristics:

- Is large enough and so configured that an employee can enter and work.
- Has limited or restricted entry or exit such as tanks, vessels, silos, storage bins, hoppers, vaults, and pits.
- Is not designed to be occupied.

## **facepiece**

A tight-fitting enclosure that fits over the face and forms a protective barrier between the user's respiratory tract and the ambient air.

## **filter**

A respirator component that removes solid or liquid particles (aerosols) from the air.

## **fit factor**

The ratio of the concentration of a contaminant in the environment to the concentration inside the mask. A quantitative measure of how well a respirator protects the user.

## **immediately dangerous to life and health (IDLH)**

Refers to any atmosphere that poses an immediate threat to a worker's life, would cause irreversible adverse health effects, or would impair the worker's ability to escape.

## **NIOSH certification program for respirators**

Requirements in 42 CFR 84 for testing and certifying non-powered, air-purifying, particulate-filter respirators.

## **oxygen-deficient atmosphere**

An atmosphere that has less than 19.5 percent oxygen by volume.

## **personal monitoring**

Measurement of an individual's exposure to contaminants with personal monitors or sample collection equipment.



## **physician or other professionally licensed health care professional (PLHCP)**

A person licensed to provide respirator medical evaluations or examinations. Any health professional who qualifies as a PLHCP can perform a medical evaluation/examination.

## **powered air-purifying respirator (PAPR)**

A type of air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

## **respiratory hazard**

Any harmful substance in the air you breathe.

## **seal check**

A set of procedures performed by the respirator user to determine if the respirator has an effective face-to-facepiece seal.

## **self-contained breathing apparatus (SCBA)**

A type of atmosphere-supplying respirator that isn't connected to a stationary source of breathable air. The user carries the air supply.

## **tight-fitting facepiece**

An inlet covering that forms a complete seal with the user's face.

## **voluntary use**

When an employee chooses to wear a respirator even though it is not required by an employer or by any Oregon OSHA rule. Employers do not have to provide respirators for voluntary users; however, employers must ensure that the employees read *437-004-1041, Appendix D*, and are medically able to use respirators. Employees who use dust masks (filtering facepieces) voluntarily must also read *437-004-1041, Appendix D*.



# Notes



## Notes

# *Oregon* OSHA Services

Oregon OSHA offers a wide variety of safety and health services to employers and employees:

## Consultative Services

- Offers no-cost, on-site safety and health assistance to help Oregon employers recognize and correct workplace safety and health problems.
- Provides consultations in the areas of safety, industrial hygiene, ergonomics, occupational safety and health programs, assistance to new businesses, the Safety and Health Achievement Recognition Program (SHARP), and the Voluntary Protection Program (VPP).

## Enforcement

- Offers pre-job conferences for mobile employers in industries such as logging and construction.
- Inspects places of employment for occupational safety and health hazards and investigates workplace complaints and accidents.
- Provides abatement assistance to employers who have received citations and provides compliance and technical assistance by phone.

## Appeals, Informal Conferences

- Provides the opportunity for employers to hold informal meetings with Oregon OSHA on concerns about workplace safety and health.
- Discusses Oregon OSHA's requirements and clarifies workplace safety or health violations.
- Discusses abatement dates and negotiates settlement agreements to resolve disputed citations.

## Standards & Technical Resources

- Develops, interprets, and provides technical advice on safety and health standards.
- Provides copies of all Oregon OSHA occupational safety and health standards.
- Publishes booklets, pamphlets, and other materials to assist in the implementation of safety and health standards and programs.
- Operates a Resource Center containing books, topical files, technical periodicals, and a video lending library.

## Public Education & Conferences

- Conducts conferences, seminars, workshops, and rule forums.
- Coordinates and provides technical training on topics such as confined space, ergonomics, lockout/tagout, and excavations.
- Provides workshops covering management of basic safety and health programs, safety committees, accident investigation, and job safety analysis.
- Manages the Safety and Health Education and Training Grant Program, which awards grants to industrial and labor groups to develop training materials in occupational safety and health for Oregon workers.

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**For more information, call the OR-OSHA office nearest you.**

*(All phone numbers are voice and TTY.)*

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### **Eugene**

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1840 Barnett Road, Ste. D  
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721 SE Third St., Ste. 306  
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# The air you breathe

 **CD — The air you breathe**

**Customizable respiratory protection programs and forms for agricultural employers**

 **DVD — Breathe Easy**

**Covers respirator safety, including selecting respirators, fit testing, maintenance, and storage.**

440-3654 (8/07)



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