Respirator Fit Test Guide

Agricultural Pesticides Handling

Ag Health & Safety Alliance

Great Plains Center for Agricultural Health

Contents

Acknowledgments

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Introduction

Respiratory exposures in agriculture may include pesticides, fertilizers, grain dust, livestock, mold, hay, exhaust from machinery, welding fumes, and other types of organic dusts. Respiratory protection is key to protecting agricultural workers from breathing these hazards.

The respirators discussed in this guide protect the user by the removal of contaminants from the air. Respirators of this type include particulate respirators, which filter out airborne particles, and air-purifying respirators with cartridges/canisters, which filter out chemicals and gases. This guide focuses on the use of respirators for handling pesticides intended for agricultural use.

Appropriate use of respirators saves lives.

Use of respirators is key to preventing both acute respiratory illness, chronic respiratory disease, and other long-term disease.

First, the respirator must be correctly selected to match the hazard.

Second, the respirator must fit properly. It must form a good seal when it is worn.

Respirator Fit Testing determines whether a specific respirator fits the face of the wearer.

Respiratory Protection Standard

Respirators provide protection from respiratory hazards only when they are properly selected, used, and maintained. U.S. workplaces follow the general industry respiratory protection standard (29 CFR 1910.134) to maximize protection. This Respiratory Protection standard applies to most workplaces and has been adopted by the Occupational Safety and Health Administration (OSHA) to also apply to construction (29 CFR 1926.106), shipyard (1915.154), and marine terminal (1917.92) longshoring operations.

The **Respiratory Protection Standard** requires employers to establish and maintain a written respiratory protection program to protect their respirator-wearing employees. Key elements of a respiratory protection program include the following:

- Respirator selection
- Medical evaluations
- Respirator fit testing
- Use of respirators
- Maintenance and care
- Assuring adequate air quality
- Identification of filters, cartridges, and canisters
- Training and information
- Program evaluation

The OSHA website also provides links to a variety of guidance documents, web pages, and online tools related to respiratory protection. Most have been created by OSHA, but some have been prepared by other federal government agencies, such as the National Institute for Occupational Safety & Health (NIOSH). Some of the guidance materials were written primarily for employers and respirator program administrators, while others are geared more for workers.

The Worker Protection Standard (WPS) Respiratory Protection Guide from the Pesticide Educational Resources Collaborative (PERC) is the most comprehensive guide on requirements for employers of pesticide handlers.

Did you know?

33% of agricultural businesses require respiratory protection.

37% of farmers report wearing respirators on their operation, and this trend is increasing. **74%** of young adults ages 18-25 in Ag Health and Safety Alliance™ programs report wearing filtering facepiece respirators for certain tasks on the farm.

Respiratory Exposures to Pesticides

Anyone working with pesticides may be exposed when mixing and loading during application and while cleaning equipment. Although the dermal (skin) exposure is usually considered a major route of exposure, inhalation of pesticides is also a concern due to the presence of airborne spray droplets and vapors. In many cases, small droplets or vapors cannot be seen. It is important to understand the respiratory hazards of commonly used pesticides used at the operation and the appropriate respiratory protection to prevent both acute and long-term illnesses.

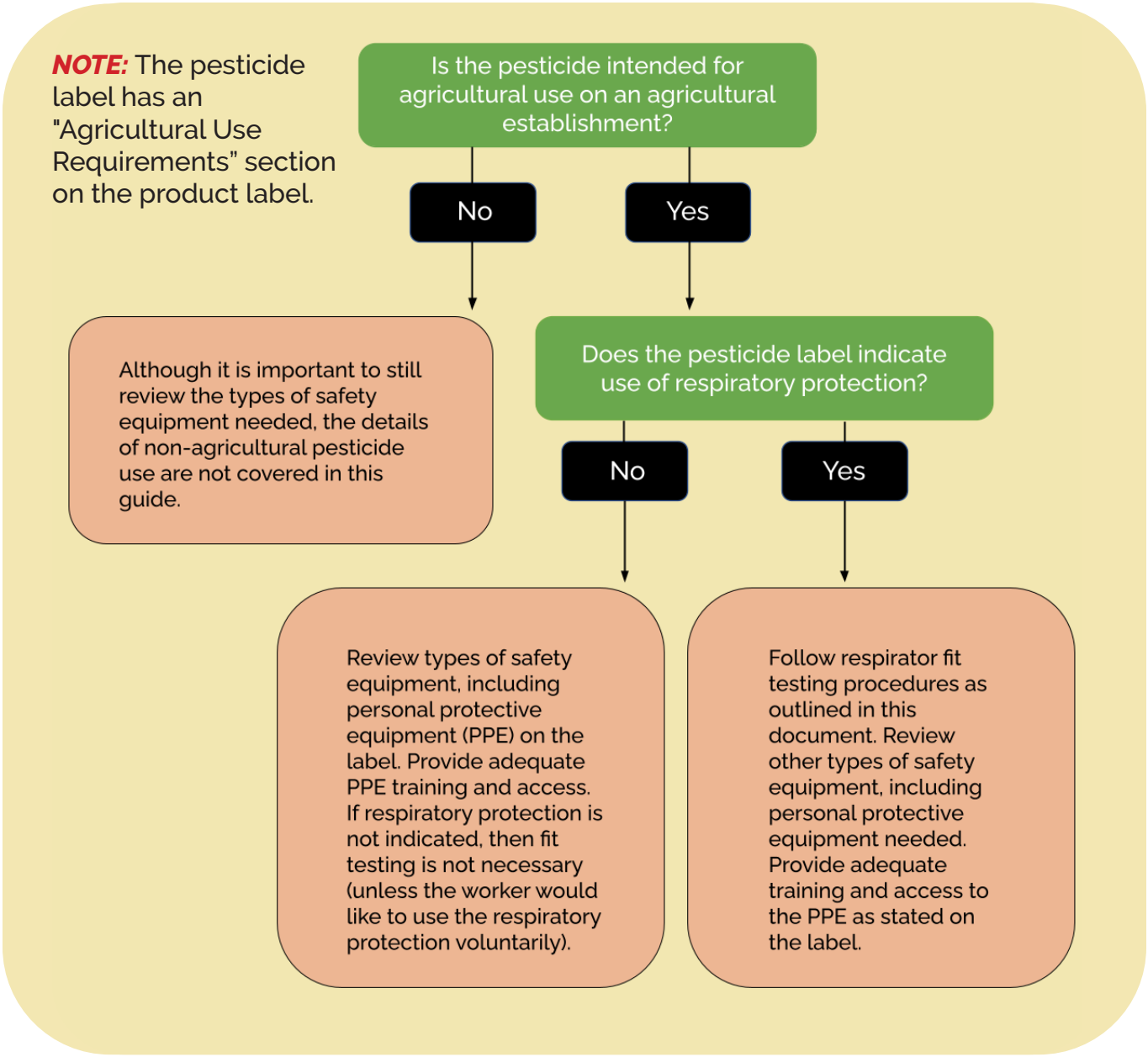
Anyone working with pesticides must check product labels to identify current formulation, associated hazards, and type of personal protective equipment (PPE) required. New pesticide products and reformulations are frequently being introduced to the agricultural marketplace, so the pesticide label is key when it comes to determining the type of respiratory protection required. Some labels require additional PPE, including respiratory protection, in the case of a spill clean-up or for emergency response activities.

Many studies conducted in the U.S. have shown that agricultural workers do not always wear appropriate respiratory protection before, during, and after pesticide application. Emergency situations, such as natural disasters or pandemics, can make it challenging to assess or purchase the respiratory protection required by the pesticide label. Cloth face coverings or surgical masks are not certified respirators. These items are made of absorbent materials that can concentrate chemicals on the woven or non-woven fabric, which could increase exposure to the wearer.

Discussion Point: *What are some challenges with wearing respiratory protection among the agricultural workforce?*

Respirator Fit Testing for Agricultural Pesticides

Pesticides are respiratory hazards in agriculture. Exposure to pesticides has been linked to short-term effects such as nose, throat, and eye irritation, nausea, dizziness, cramping, and diarrhea. Long-term health effects include cancer, birth defects, neurological disorders, asthma, and other respiratory disorders (PERC, 2020). There are two entities responsible for the oversight of respirator fit testing in agriculture: Environmental Protection Agency (EPA) and OSHA.



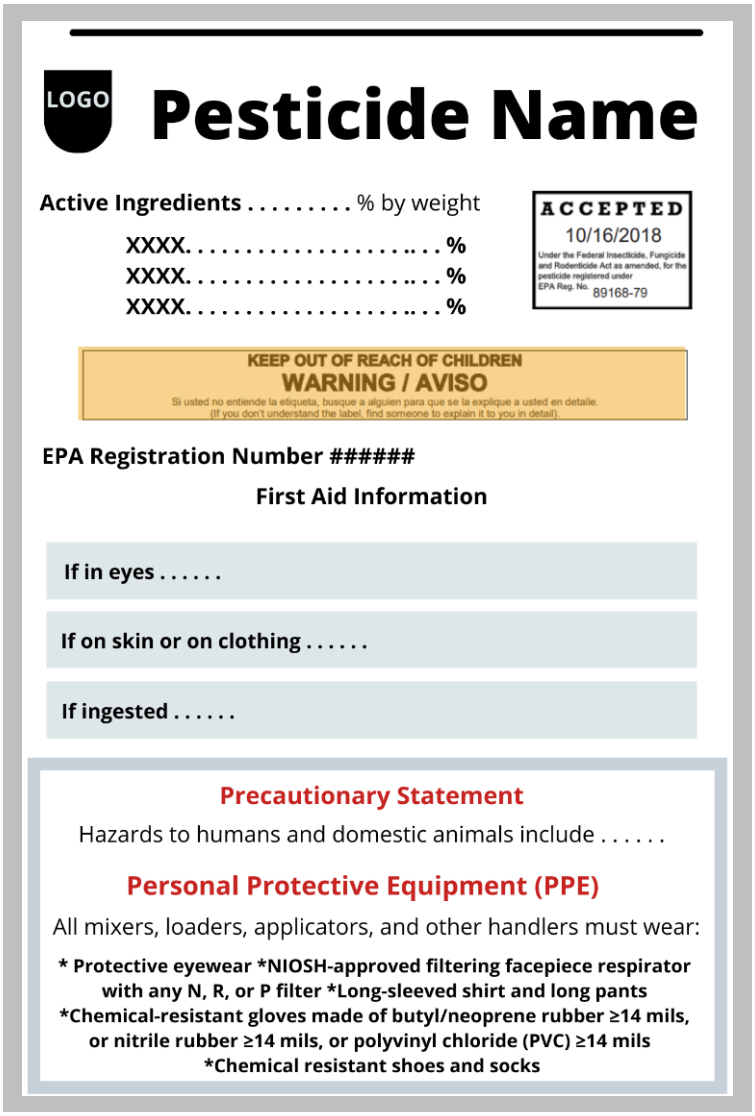
In 2015, **the EPA revised its Worker Protection Standard** [WPS; 40 CFR 170.507 (b)(10)] and included information from OSHA's Standard for Respiratory Protection (29 CFR 1910.134). If the pesticide *label indicates that respirator use is required,* then according to the WPS, OSHA standards for *fit testing, training, and medical evaluation must be followed.*

Pesticide Labels

Anyone working with a pesticide must follow all personal protective equipment (PPE) requirements listed on the label. This is a legal requirement for using pesticides. Pesticides that carry a risk of inhalation exposure include a statement that a respirator is required PPE.

In the United States, the label is the law.

Pesticide labels are legal documents. They contain detailed information on how to use the product correctly. Labels also contain information on potential hazards associated with the product, signs and symptoms that may develop if exposure occurs, and instructions in the event of a spill or coming into contact with a pesticide. Following label instructions will minimize the risks to the applicator.



In addition to this photo, the Protect your Health Read the Label infographic is available from the National Pesticide Information Center at npic.orst.edu/health/readlabel.html.

The required respiratory protection can be found on the label within the "Precautionary Statements" section under "Personal Protective Equipment", which is often near the precautionary statement. In the U.S., most pesticide labels requiring respirators to protect against hazardous particles in the air will recommend a NIOSH-approved respirator using an N, R, or P filter for particles including dusts and droplets or organic vapor cartridges. *It is important to consider mixing formulation as described on the label (e.g., water, oil) when deciding which filter to use.*

For particle / mist filtration, the three classifications are:

- N-series filters should be used only for non-oil aerosols.
- R-series can be used if oil is present, and that filter should not be reused beyond a single work shift.
- P-series filters can be used for protection against oil or non-oil aerosols. If oil is not present, then they can be reused for a longer duration if they are not damaged, soiled, or causing increased breathing resistance when worn.

Worker Protection Standard (WPS): Respirator Fit Testing

The Worker Protection Standard (WPS), revised in 2015, contains requirements for pesticide handlers when product labels require the use of a respirator. Pesticide safety training materials with the expanded content required by the 2015 WPS must be used to train workers and handlers. EPA-approved training materials for national use are also available on the Pesticide Educational Resources Collaborative website at pesticideresources.org/wps/.

Employers must provide the following protections for workers and handlers **when using agricultural pesticide products that require the use of a respirator:**

1. **A medical evaluation by a physician or other licensed health care professional** that conforms to the provisions of 29 CFR 1910.134(e) is required for each worker — to ensure their physical ability to safely wear the respirator specified on the pesticide product labeling.

2. **Annual fit test for each type of respirator required by the pesticide product(s) label** that the handler will be using. The fit testing must be done in a manner that conforms to the provisions of 29 CFR 1910.134, including Appendix A.

3. **Annual training on how to properly use the respirator(s)** specified on the label of the pesticide products the handler will be using. The training must conform to the provisions of 29 CFR 1910.134(k)(1)(i) through (vi).

4. The employer must **maintain records that document the completion of the requirements** in the WPS — for at least two years from the dates conducted. These requirements include providing, using, cleaning, and maintaining respirators in conjunction with other PPE, preventing heat illness, and tracking respirator change schedules.

The WPS protects primarily **workers** (people employed to perform work activities related to the production of agricultural plants) and **pesticide handlers** (people employed to mix, load, or apply pesticides for use on agricultural establishments in the production of agricultural plants).

Medical Evaluation

The medical evaluation section of OSHA's Respiratory Protection standard, 1910.134(e), states that an individual's ability to wear a respirator is determined through medical evaluation process. This starts with the administration and review of the OSHA Respirator Medical Evaluation Questionnaire (Appx. C to the standard) or equivalent. This is reviewed by a physician or licensed health care professional (PLHCP) to perform the evaluation.

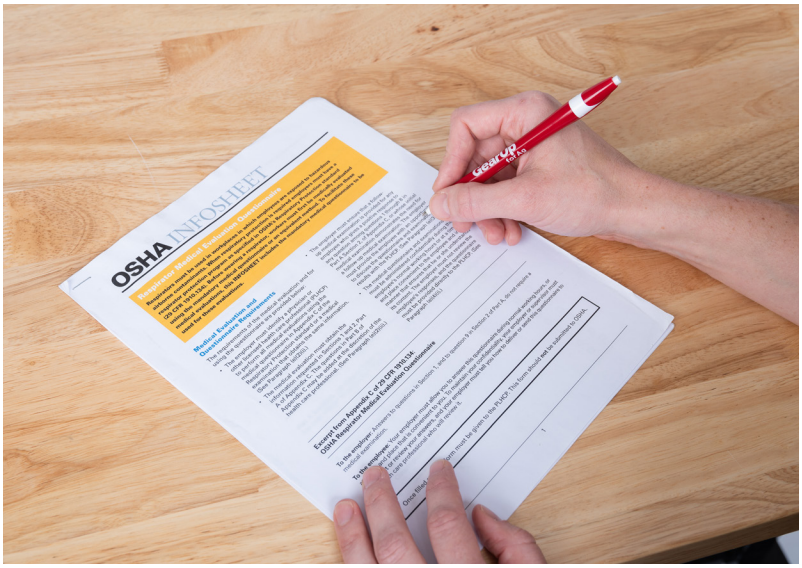
A positive response to any of the questions 1-8 on the Medical Evaluation questionnaire (section 2, Part A) would require a follow-up medical examination. These often include questions about smoking, pulmonary or lung conditions, and specific use of medications. "Skipping" or "not answering" these questions is also likely to lead to a follow-up examination, so it is important for the person administering the questionnaire to make sure it is filled to completion.

NOTE: Even though a positive response to some of the questions on the questionnaire would qualify for a follow-up examination, the Medical Evaluation Questionnaire must always be reviewed by a physician or other licensed health care provider (PLHCP). See the table on page 23 for a list of individuals qualified to review the questionnaire.

Respirator Use Information Needed by Physician (before or at evaluation):

- Type of respirator used
- Frequency of use
- Duration of use
- Physical demands while wearing respirator
- Environmental conditions (heat, sunlight, cold, etc.)
- Other protective equipment worn

CONFIDENTIALITY: The medical questionnaire and examinations must be administered confidentially during normal working hours or at a time and place convenient to the worker and in a manner that ensures that they understand its content. The employer must not review the employee's responses, and the questionnaire must be provided directly to the physician or other licensed health care provider. (See Paragraph (e)(4)(i).)



Did you know?

Wearing an air-purifying respirator increases physiological strain (heart rate, oxygen consumption, etc.). This can reduce a person's tolerance to heat, particularly during moderate or heavy activities.

Medical Evaluation (cont.)

Follow-up Physical Examination

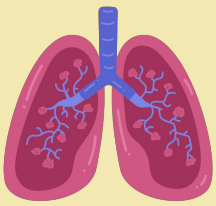
A follow-up consultation or physical evaluation is required for anyone who gives a positive response to any questions 1-8 in Part A. This exam will include any medical tests, consultations, or diagnostic procedures that the physician determines is necessary.

Physiological conditions that may impact the individuals ability to wear a respirator include the following:

- Severe pulmonary disease
- Severe cardiac disease
- Uncontrolled hypertension
- Claustrophobia
- Facial abnormalities that prevent good fit
- Work in extreme heat (A. Johnson, 2016; Szeinuk et al, 2000)
- Work at high elevation (J. Szeinuk et al, 2000)

Pulmonary effects

» Increased breathing resistance
» Increased physical effort to breathe
» Decreased endurance
» Decrease in exercise performance

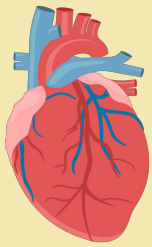


Psychological effects

» Claustrophobia
» Anxiety
» Stress
» Hyperventilation

Cardiac effects

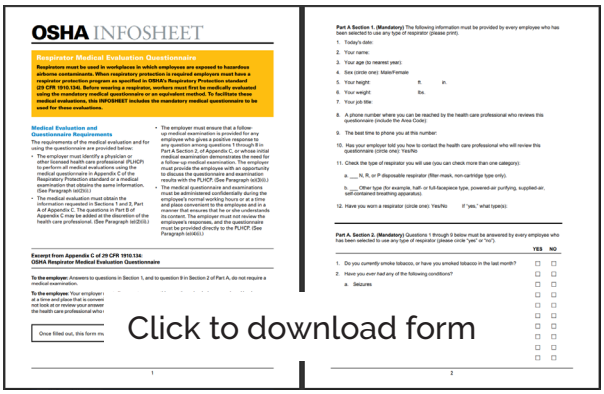
» Increased cardiac work
» Increased heart rate
» Increased blood pressure



Medical Evaluation Forms

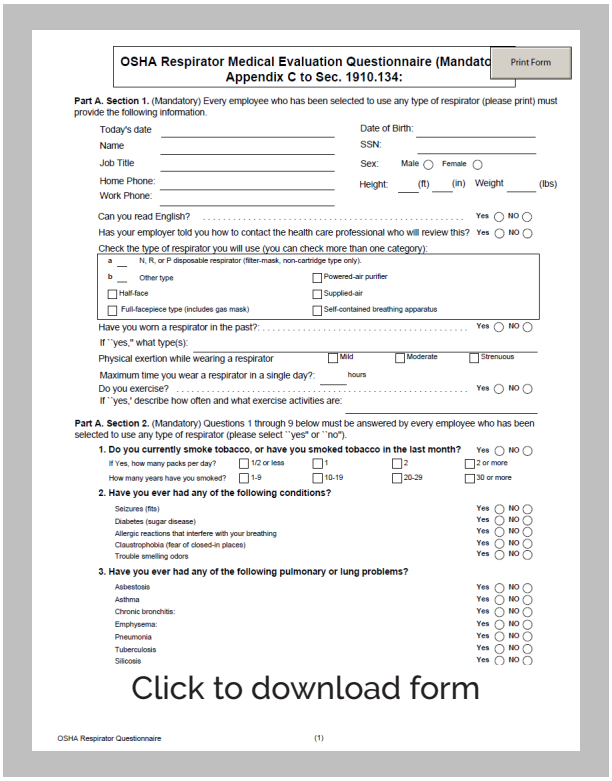
OSHA INFOSHEET

Before wearing a respirator individuals must first be medically evaluated using the mandatory medical questionnaire or an equivalent method. To facilitate these medical evaluations, this INFOSHEET includes the mandatory medical questionnaire to be used for these evaluations.



www.osha.gov/sites/default/files/publications/OSHA3790.pdf

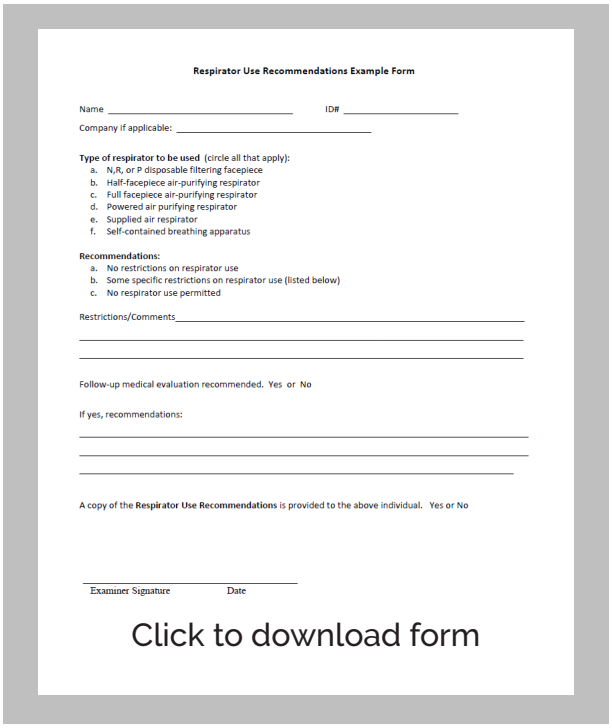
Sample OSHA Respirator Medical Evaluation Questionnaire



https://aghealthandsafety.com/wp-content/uploads/2023/11/OSHA-Respirator-Questionnaire.Fill-Print.pdf

Sample Respirator Medical Recommendation Form

Based on review of the OSHA Respirator Medical Evaluation Questionnaire (Mandatory) this form must be completed by a licensed medical provider.



https://aghealthandsafety.com/wp-content/uploads/2023/11/Individuial-Respirator-Use-Recommendations.pdf

WPS: IMMEDIATE FAMILY EXEMPTION

When an agricultural establishment is majority-owned by one family, the WPS exempts owners and members of their immediate family from many of the WPS requirements. However, while enforcement will not ***fine*** the establishment for not following these guidelines, ignoring the safety precautions may put workers (e.g., family members) at risk. Any other workers on the farm (including extended family members) are not exempted by the WPS.

Did you know?

The "immediate family exemption" may apply to many agricultural workers. Over half of all farms in the U.S. are small and mid-sized family-owned farms (USDA, 2018). However, not following label requirements will put workers at risk.

Owners of agricultural establishments are still required to do the following things for themselves and/or employed pesticide handlers who are immediate family members:

- Wear a respirator if required by the pesticide product label.
- Provide a respirator that is clean and in good working condition.
- Provide a medical evaluation before wearing a respirator.
- Provide fit testing.
- Provide respirator training.
- Maintain records of medical evaluation, fit testing, and/or respirator training.

While the following are recommended and required by OSHA, the "immediate family exemption" means that there is no enforcement regarding the following safety rules. It is still recommended to do the following best practices:

- Ensure that respirators are used correctly, maintained, and/or cleaned according to manufacturer's instructions.
- Ensure that damaged respirators are rendered unusable.
- Provide a place to store and put on PPE that is away from stored pesticides.

Good practice should be the norm.

Even though some of the requirements of WPS are exempt for agricultural establishments with immediate family members as workers, incorrectly used or faulty respirators put family members' health at risk. Although it is not 'required', farm families should still perform recommended respirator maintenance and storage.

Notes:

Respirator Fit Testing

Types of Respirators for Fit Testing

The Pesticide Educational Resources Collaborative (PERC) has already created a WPS Respiratory Protection Guide that covers all the most frequently worn types of respirators for pesticides handling.

Fit tests are required for users wearing respirators with a tight-fitting facepiece, such as disposable particulate filtering facepiece repirators (FFRs), half-facepiece respirators, and full-facepiece respirators.

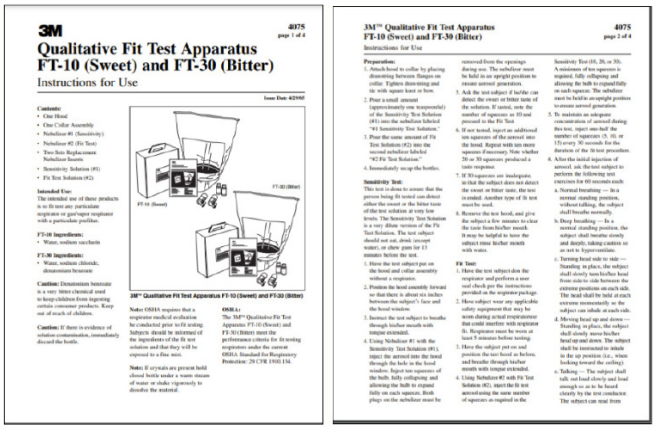
These three types are the most common respirators used when handling pesticides.

Respirator Fit Test Kit Information

Qualitative Fit Test Kit can be purchased from a wide range of online safety supply stores. The price ranges from $175-$400 per kit. The cost depends on the brand and type of fit test solution included in the kit. Additional fit test solution and replacement fit test hoods can also be purchased separately. Qualitative tests are commonly used for filtering facepiece respirators (commonly called "FFRs" and “N95s”). When testing fit of elastomeric respirators using this method, you must use P-100 particle filters alone or in combination with any chemical cartridge.

Quantitative Fit Test Kit equipment can be rented or purchased from online safety supply stores. The cost varies depending on the brand and type of equipment. Note that P-100 cartridges with adapters must be purchased for each type (brand and model) of respirator that is being fit tested. (Costs range from $6,000-20,000 to purchase, or $150-300/day to rent.)

Fit test kit instructions will differ by kit type, so it is important to follow the instructions provided in your kit. An example has been provided, below. On the following pages, more advanced instructions will be included.



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Qualitative Fit Test Apparatus
FT-10 (Sweet) and FT-30 (Bitter)

Instructions for Use

Issue Date: 4/2005

Contents:
- One Hood
- One Collar Assembly
- Nebulizer #6 (Sensitivity)
- Nebulizer #5 (Fit Test)
- Two Solo Replacement Nebulizer Inserts
- Sensitivity Solution (#1)
- Fit Test Solution (#2)

Intended Use:
The intended use of these products is to fit test any particulate respirator or gas/vapor respirator with a particulate prefilter.

FT-10 Ingredients:
- Water, sodium saccharin

FT-30 Ingredients:
- Water, sodium chloride, denatonium benzoate

Caution: Denatonium benzoate is a very bitter chemical used to keep children from ingesting certain consumer products. Keep out of reach of children.

Caution: If there is evidence of solution contamination, immediately discard the bottle.

3M™ Qualitative Fit Test Apparatus FT-10 (Sweet) and FT-30 (Bitter)

Note: OSHA requires that a respirator medical evaluation be conducted prior to fit testing. Subjects should be informed of the ingredients of the fit test solution and that they will be exposed to a fine mist.

Note: If crystals are present hold closed bottle under a warm stream of water or shake vigorously to dissolve the material.

OSHA:
The 3M™ Qualitative Fit Test Apparatus FT-10 (Sweet) and FT-30 (Bitter) meet the performance criteria for fit testing respirators under the current OSHA Standard for Respiratory Protection: 29 CFR 1910.134.

3M™ Qualitative Fit Test Apparatus
FT-10 (Sweet) and FT-30 (Bitter)

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Instructions for Use

Preparation:
1. Attach hood to collar by placing drawstring between flanges on collar. Tighten drawstring and tie with square knot or bow.
2. Pour a small amount (approximately one teaspoonful) of the Sensitivity Test Solution (#1) into the nebulizer labeled "#1 Sensitivity Test Solution."
3. Pour the same amount of Fit Test Solution (#2) into the second nebulizer labeled "#2 Fit Test Solution"
4. Immediately recap the bottles.

Sensitivity Test:
This test is done to assure that the person being fit tested can detect either the sweet or the bitter taste of the test solution at very low levels. The Sensitivity Test Solution is a very dilute version of the Fit Test Solution. The test subject should not eat, drink (except water), or chew gum for 15 minutes before the test.

1. Have the test subject put on the hood and collar assembly without a respirator.
2. Position the hood assembly forward so that there is about six inches between the subject's face and the hood window.
3. Instruct the test subject to breathe through his/her mouth with tongue extended.
4. Using Nebulizer #1 with the Sensitivity Test Solution (#1), inject the aerosol into the hood through the hole in the hood window. Inject ten squeezes of the bulb, fully collapsing and allowing the bulb to expand fully on each squeeze. Both plugs on the nebulizer must be removed from the openings during use. The nebulizer must be held in an upright position to create aerosol generation.
5. Ask the test subject if he/she can detect the sweet or bitter taste of the solution. If noted, note the number of squeezes: as 10 and proceed to the Fit Test.
6. If not noted, inject an additional ten squeezes of the aerosol into the hood. Repeat with ten more squeezes if necessary. Note whether 20 or 30 squeezes produced a taste response.
7. If 30 squeezes are inadequate, in that the subject does not detect the sweet or bitter taste, the test is ended. Another type of fit test must be used.
8. Remove the test hood, and give the subject a few minutes to clear the taste from his/her mouth. It may be helpful to have the subject rinse his/her mouth with water.

Fit Test:
1. Have the test subject don the respirator and perform a user seal check per the instructions provided in the respirator package.
2. Have subject wear any applicable safety equipment that may be worn during actual respirator use that could interfere with respirator fit. Respirator must be worn at least 5 minutes before testing.
3. Have the subject put on and position the test hood as before, and breathe through his/her mouth with tongue extended.
4. Using Nebulizer #2 with Fit Test Solution (#2), inject the fit test aerosol using the same number of squeezes as required in the Sensitivity Test (10, 20, or 30). A minimum of ten squeezes is required, fully collapsing and allowing the bulb to expand fully on each squeeze. The nebulizer must be held in an upright position to ensure aerosol generation.
5. To maintain an adequate concentration of aerosol during this test, inject one-half the number of squeezes (5, 10, or 15) every 30 seconds for the duration of the fit test procedure.
6. After the initial injection of aerosol, ask the test subject to perform the following test exercises for 60 seconds each:
   a. Normal breathing — In a normal standing position, without talking, the subject shall breathe normally.
   b. Deep breathing — In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.
   c. Turning head side to side — Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.
   d. Moving head up and down — Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).
   e. Talking — The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from

Example of 3M Qualitative Fit Test Apparatus FT-10 (Sweet) and FT-30 (Bitter) instructions provided with the kit.

Types of Respirator Fit Testing

There are two types of fit tests: qualitative and quantitative.

Qualitative Fit Test

Qualitative fit testing is a pass/fail test method that uses the wearer's sense of taste or smell, or their reaction to an irritant to detect leakage into the respirator facepiece. Qualitative fit testing does not measure the actual amount of leakage. Whether the respirator passes or fails the test is based simply on the wearer detecting leakage of the test substance into their facepiece. There are four qualitative fit test methods accepted by OSHA:

- Isoamyl acetate, which smells like bananas
- Saccharin, which leaves a sweet taste in your mouth
- Bitrex, which leaves a bitter taste in your mouth
- Irritant smoke — adherence to the OSHA Irritant Smoke Protocol manages the risk of this hazardous substance (training specific to this agent is necessary)

By passing the qualitative fit test, users can be assured that the concentration of contaminant that is breathed through the respirator is reduced by a factor of 10, commonly assigned to all half-face respirators. If more protection is needed, a quantitative fit test is needed for full-face respirators.

Quantitative Fit Test

Quantitative fit testing uses a machine to measure the actual amount of leakage into the facepiece and does not rely upon the worker's sense of taste, smell, or irritation to detect leakage. The respirators used during this type of fit testing will have a probe attached to the facepiece that will be connected to the machine. There are three quantitative fit test methods accepted by OSHA:

- Generated aerosol
- Ambient aerosol
- Controlled negative pressure

Quantitative fit testing can be used for any type of tight-fitting respirator. You must use P100 cartridges with QFT adapters that are suitable for the respirator being tested.

In this section are the steps and procedure for conducting a qualitative respirator fit test. These notes are for reference only. Remember to always use the instructions provided in the respirator fit test kit.

Respirator Fit Test Procedure (Qualitative)

Preparing Nebulizers

Most qualitative fit test kits will come with two nebulizers. One is for the threshold/sensitivity test and the other is for the actual fit test. Below are some tips for preparing both nebulizers prior to fit testing.

1. It is recommended that you wear disposable gloves (such as nitrile gloves) when handling the solution.
2. Remove the top half of the nebulizer by unscrewing the top from the bottom.
3. Using index finger, lightly push down on the atomizer to make sure it is seated all the way down (see Image 1).
4. Check that O-ring is seated in each nebulizer.
5. Add a ½ teaspoon of the *sensitivity* fit test solution into the *sensitivity* nebulizer. Screw the lid on (See Images 2-3). Test that the nebulizer is functioning. Observe to make certain a fine mist is emitted when the nebulizer is squeezed.
6. For the fit test solution, add a ½ teaspoon of the *fit test* solution into the *test* nebulizer. Screw the lid on. Make sure that the nebulizer is functioning. Observe to make certain a fine mist is emitted when the nebulizer is squeezed (See Image 4).

Image 1

Image 2

Image 3

Image 4

Remember:

It is easy to spill the solution from the nebulizers, so always use the holder available in the fit test kit to keep them upright and never lay them on their side.

Respirator Fit Test Process Steps

1. **<u>Set up an area for fit testing.</u>**
   a. Clean area surfaces; equipment, and establish an area for fit testing and an area where the participant can select respirators.

Check the "Fit Test Area" and make sure you have the following:

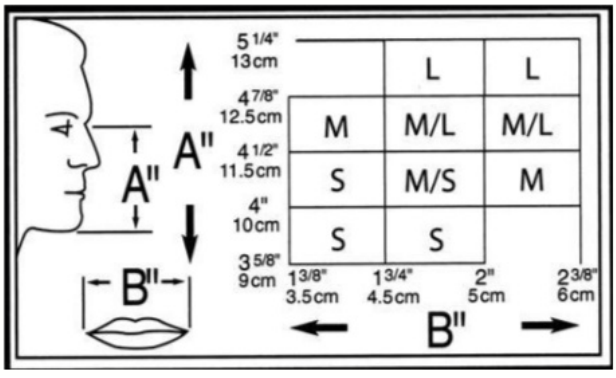
- ✓ Fit test kit and necessary items
- ✓ Cleaning materials
- ✓ Information on respirator sizing and a ruler
- ✓ Fit test record (to go with participant)
- ✓ Information on how to do a FIT CHECK to assist the participant when doffing
- ✓ Fit Test Exercise list, preferable with photos for the participant to view
- ✓ Rainbow Passage in appropriate language or other approved passage
- ✓ Any other documentation that you need for tracking purposes

2. **<u>Welcome the participant and describe the process.</u>**
   a. Discuss the fit test process and have them select the respirator they would like to use. Some participants may already come with their respirator or a respirator that they plan to use in hand.
   b. Inquire if they have worn a respirator in the past and if they can remember their sizing information.
   c. Obtain and review the manufacturer's fit instructions. Make sure the respirator is the correct size and shape for their face. See the example image, provided below.

   d. Demonstrate proper donning procedures and have the participant perform a FIT CHECK (note: this is not the actual fit test).
   e. Assess individual's comfort, and if needed, select a different respirator.
   f. Demonstrate proper doffing (removal) of respirator and have the participant follow the doffing procedure.

Did you know?

The individual performing the fit test should know how to provide guidance on appropriate respirator selection according to the right size and shape of the participant's face. If the wrong size of respirator is selected, then the participant will likely "fail" the test and it will take more time to complete. A respirator fit test is also a good time to provide education on the proper use of the respirator.



Example of 3M Size Chart for a standard half-face cartridge style respirator.

3. **Conduct the threshold sensitivity test.**
   a. With no respirator on, place the hood on the participant.
   b. Inform participant to breathe through open mouth with tongue slightly extended.
   c. Use 10 full, rapid squeezes of nebulizer with ***sensitivity solution*** into hood, not directly at mouth.
   d. Ask wearer to report if they taste bitterness/sweetness.
   e. If not, do 10 more squeezes; up to 30 total.
   f. Without a respirator, note the number of nebulizer puffs it takes for the individual to sense the compound (e.g., 10, 20, 30, not detected) on the form. If the participant cannot taste or sense the original sensitivity solution, another solution type must be used. Write results on the fit test form.

Types of Solution:

Saccharine: This aerosol solution has a sweet taste and is more commonly used.

Bitrex: This aerosol solution has a bitter taste and is less common. However, it may be used as an alternative.

4. **Begin the Fit Test.**
   a. Have the participate don the respirator and repeat the FIT CHECK.
   b. Put on the fit test hood and begin to use the FIT TEST SOLUTION nebulizer, using the 10 / 20 / 30 puffs as determined from sensitivity test.
   c. Start your timer.
   d. *Every 30 seconds* of the test, replenish the shroud **with ½ the number** of squeezes needed to achieve the taste threshold response above **(5, 10, or 15).**

5. **Perform the Fit Test Exercises,** 60 seconds for each of the 8 activities (detailed on the following page).
   a. For each exercise, repeat the correct number of puffs (5, 10, or 15) every 30 seconds inside the hood and ask the participant if they experience the taste from the sensitivity test.
   b. If the participant can taste/sense the chemical ***at any time*** during these exercises, the respirator is a **fail** and it does not fit. End the test at this time.

6. **End the Fit Test.**
   a. At the end of the test, keep the hood on and ask the participant if they can sense the chemical. As a teaching opportunity, you may allow the participant to intentionally break the seal of the respirator to experience the chemical taste of the solution. This should be quick to allow the wearer insight on how the respirator was working.
   b. Remove the test hood and ask the participant to take off their respirator.
   c. Use alcohol wipes to clean the respirator if it is reusable.
   d. Complete the form and keep a copy and provide a copy to the participant. Confirm make, model, and size of respirator worn.
   e. Disinfect the hood and nebulizers between each fit test using a disinfectant from the **list of products that meet EPA criteria for use against SARS-CoV-2** (the cause of COVID-19), such as wiping with 70% Isopropanol solution with 1-minute contact time or other approved disinfectants.

NOTE: The hood then needs to air out for about 15 minutes before being used again to eliminate the smell of the disinfecting chemicals. If scheduled testing is back-to-back, you want to rotate between at least two hoods to allow time to dissipate this smell.

   f. When done, nebulizers should be rinsed in warm water after every session and the remaining solution in the nebulizer should be discarded.

Respirator Fit Test Exercises

Exercises should be performed while standing. The respirator wearer will conduct each of these exercises, in order, for 60 seconds each. If at any time you sense the chemical (like you did during the sensitivity test without the respirator on), let us know and we will stop the test. This means the respirator is not fitting you and we need to readjust or select another respirator.

1. **Normal breathing.** In a normal standing position, without talking, breathe normally.
2. **Deep breathing.** In a normal standing position, breathe slowly and deeply without hyperventilating.
3. **Turning head side to side.** Standing in place, slowly turn head from side to side between the extreme positions on each side.
4. **Moving head up and down.** Standing in place, move head up and down. Inhale in the "up" position (i.e., when looking toward the ceiling).
5. **Bending over.** Bend at the waist as if touching the toes. Jogging in place shall be substituted for this exercise if the fit test unit does not permit bending over at the waist.
6. **Talking.** Talk out loud slowly and loud enough so as to be heard clearly by the tester. The Rainbow Passage is suggested (on the next page).
7. **Normal breathing.** Same as first exercise.

Normal breathing

Deep breathing

Side to Side

Up and down

?

Discussion Point:
When showing these exercises to the participant, would you demonstrate in-person or rely on photos or charts?

Discuss your reasoning.

Bending over

Talking

Normal breathing

For Exercise 6: Rainbow Passage

Did you know?

The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

Rainbow Passage (English)

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Pasaje Arcoiris (Española)

Cuando la luz del sol ilumina a las gotas de lluvia en el aire, estas actuan como un prisma y forman un arco iris. El arco iris es una división de luz blanca dentro de muchos colores bellos. Estos toman la forma de un arco largo redondeado con su paso alto arriba, y sus dos extremos aparentemente están más allá del horizonte. Hay, de acuerdo con la leyenda, un recipiente con oro hirviendo en un extremo. La gente mira, pero nadie nunca lo encuentra. Cuando un hombre busca algo más allá del alcance, sus amigos dicen que el está buscando el recipiente de oro en el extremo del arco iris.

Education and Respirator Inspection Sample Form

Respirator Inspection Checklist	
Face-piece	☐ No cracks, tears, or holes ☐ No face-mask distortion ☐ No cracked or loose lenses or face shields ☐ If full-face, visibility check
Head straps	☐ No breaks or tears ☐ No broken buckles
Valves	☐ Present (inhalation, exhalation) ☐ No residue or dirt, cracks, or tears in valve material
Filters and cartridges	☐ NIOSH approved ☐ Gaskets seat properly ☐ No cracks or dents in housing ☐ Proper cartridge for hazards ☐ Cartridges not outdated and working properly
Air supply systems	☐ Breathing-quality air is used ☐ Supply hoses are in good condition ☐ Hoses are properly connected ☐ Settings on regulators and valves are correct

Fit Test Record

According to the PERC Worker Protection Standard (WPS) Respirator Guide,

A written record of the fit test must be maintained for two years from the date conducted and must contain the following information at a minimum:

- Name of handler tested,
- Type of fit-test performed,
- Make, model, and size of the respirator tested,
- Date of the fit-test, and name of fit tester.

Sample Qualitative Respirator Fit Test Record

The following record sheet was adapted from materials found at the Pesticide Education Resources Collaborative (PERC). It is meant to serve as a model for a form that can be used during the fit test to record data (sensitivity and fit test results), and then kept on file to satisfy WPS record keeping requirements.

Date:

Employee name:

Job/Classification:

Farm/Company:

Fit test method (check one):

☐ Qualitative saccharin/"sweet solution" (respirator needs particulate filtration)

☐ Qualitative Bitrex/"bitter solution" (respirator needs particulate filtration)

☐ Qualitative Isoamyl acetate/"banana oil" (respirator needs organic vapor cartridge)

Taste Threshold Results *(circle one)*

10 squeezes 20 squeezes 30 squeezes Not detected (end test)

½ to be administered every 30 seconds during Fit Test Exercises *(circle one)*

5 squeezes 10 squeezes 15 squeezes

Type of respirator	Make/model/size *(Must include all three)*	Fit factor/results *(Circle one)*
		Pass Fail
		Pass Fail
		Pass Fail
		Pass Fail

Person conducting the fit test:

Problems the employee encountered with respirator:

TIPS FOR FIT TESTING

- **Follow special precautions to ensure your safety and the safety of those being fit tested during times of illness or outbreaks.** Steps such as frequent handwashing, distancing, and proper cleaning/disinfecting between participants can prevent the spread of disease. Do not allow participants to "share respirators".

- ***Prior to fit testing*, it is important to notify the participant ahead of time about facial hair impedance.** If you fit test a participant who refuses to remove their facial hair, educate them on the impedance of facial hair with proper respirator fit. The chances are high that they will indeed fail the fit test. Alternatively, in some cases you may provide a razor, shaving cream, and mirror for them to prepare for the test.

- **Understand how many tests your solution is good for.** Typically, there is enough solution in the fit test solution bottle single fit test kit to conduct 80 to 150 fit tests before needing to re-order. Some fit test kits include ampules of solution that is for one time use. Plan accordingly.

- **At the current time of this publication (February 2024), it is not advisable to fit test a young child with a respirator if asked to do so.** Most respirator models will not fit a young child's face shape and size. Not much is known about young children's adherence to appropriate respirator donning and doffing protocols.

- **When scheduling respirator fit tests, a good rule of thumb is to assign approximately 20 minutes per fit test.**

- **Check for wear and tear to fit testing equipment after each use.** This will help you determine if a new kit needs to be ordered. Manufacturers of most fit test kits will allow you to order small replacement parts.

Notes:

Community-Based Respirator Fit Testing

In rural agricultural communities, a network of individuals and/or organizations is needed to make sure agricultural workers have access to fit testing.

Consider all the unique places in your own community where respirator fit testing may occur. This could be in a medical office, county extension, a local pharmacy, a school, or on the farm. Organizations may need to partner together.

Although one person or organization may be able to perform all aspects of fit testing—this is not common. In most cases, communities will need to rely on more than one individual or organizations to accomplish fit testing procedures that comply with OSHA standards. For example, someone who knows how to fit test respirators would need to partner with a PLHCP for Medical Questionnaire review and Medical Evaluation.

This will require building a community network to fulfill all the roles and responsibilities described on page 23. Community members will need to decide what items will likely require a fee-for-service structure, and what items may be provided for free.

The following items will most likely require some type of fee-for-service structure:

- Review Medical Questionnaire
- Medical Evaluation and Medical Follow-Up
- Respirator Fit Test
- Respirator Use Education
- Respiratory Protection Program Administration
- Retail Sales of Respirator Supplies

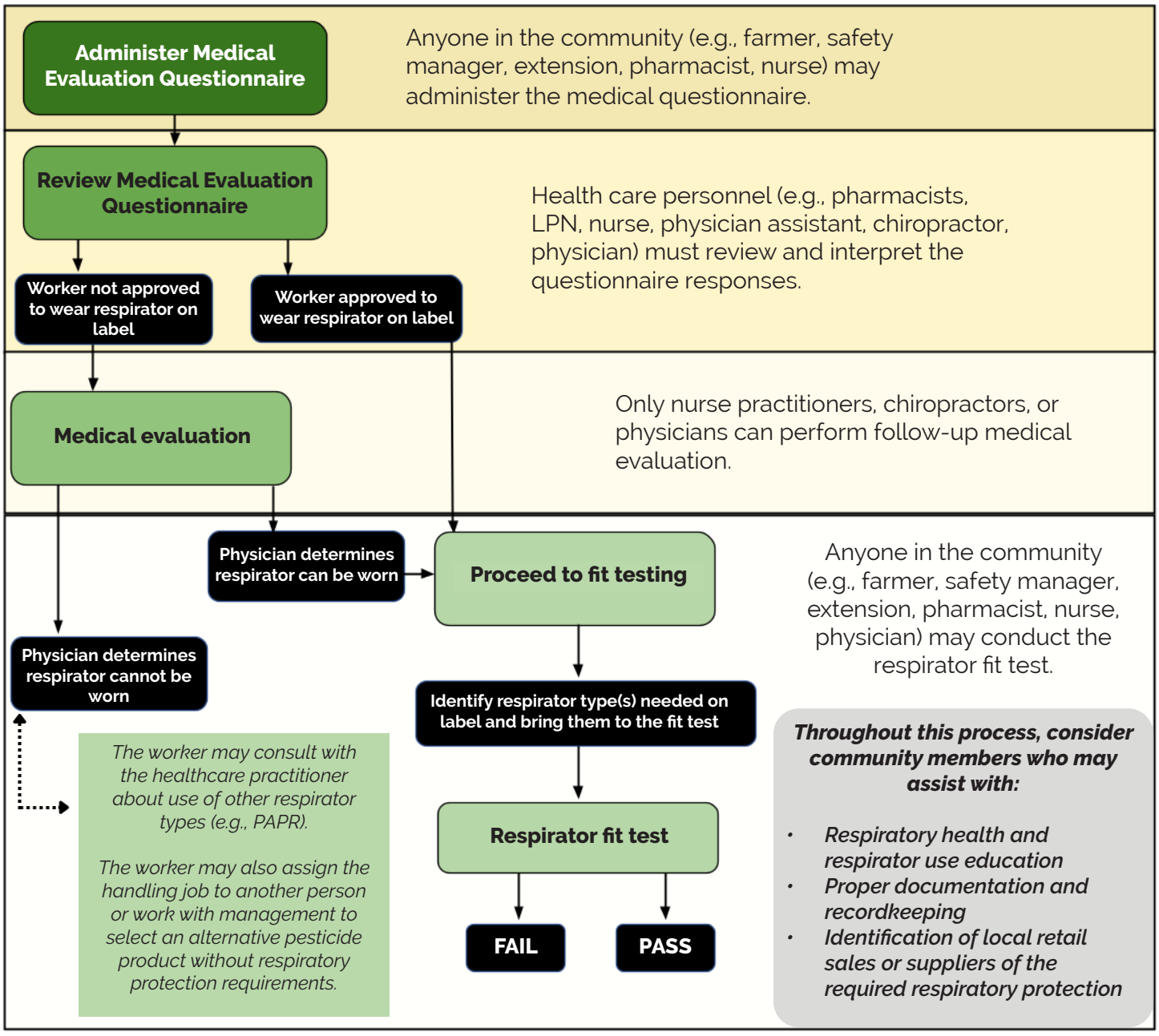
The following items may be available and provided at no cost by government entities, educational institutions or nonprofit-based organizations:

- Questionnaire Administration
- Pesticide Label Interpretation
- Respirator Use Education
- WPS Compliance Consultation
- Retailer Guidance on Respirator Selection

Discussion Point: *Consider some challenges to administering respirator fit testing for agricultural workers in the community.*

A pesticide is intended for agricultural use on an agricultural establishment and the label indicates use of respiratory protection. Below are the steps describing how a community-based respirator fit test may be applied.

Community-Based Respirator Fit Testing



Fit testing a respirator is an important part of the entire process of appropriate respiratory protection. Other aspects of respirator fit testing include the availability of respirators and cartridges for specific respiratory hazards. Individuals or health care providers who perform respiratory fit testing and assist with the administration of a respirator program are often also the resource for assisting the individual in finding the right respirator and purchasing decisions. Creating a community-based respirator fit test model will assist in making certain that all aspects of appropriate respirator protection are available.

Community-based fit test program planning

When establishing a community-based respirator fit testing in your community consider the following items:

1. What are your qualifications? (Safety officer, nurse, pharmacist, farmer, farm wife, physician, nurse practitioner)

2. Are you able to administer the OSHA Medical Questionnaire in the appropriate language? Yes / No
   If no, who can administer this questionnaire?

3. Are you qualified and willing to review the medical questionnaire? Yes / No
   If no, who can review the medical questionnaire?

4. Are you qualified and willing to perform the medial evaluation? Yes / No
   If no, who can perform the medical evaluation?

5. Do you plan to perform respirator fit tests in your community? Yes / No
   If no, who would be able to do this?

6. Are you confident in your ability to read pesticide labels and recommend the appropriate respiratory protection? Yes / No
   If no, who would be your resource to read labels and recommend appropriate respirator protection?

7. List the organizations or individuals who would be part of your community-based respirator fit testing:
   a. Medical professional_____
   b. Safety professional_____
   c. Professional Licensed Health Care Providers (PLHCP) _____
   d. Others_____

8. Where can people purchase respiratory protection in your community?
   a. Research what respirators are available in the community
   b. Make a list (including prices) for people seeking fit testing

9. If respiratory protection is not available or is limited in your community, where else can people buy respiratory protection?

10. Do you know the cost of respirators of all types? Yes / No
    a. Make a list of respirators commonly used
    b. Research local and online prices of respirators

Roles and Responsibilities

What is your role in respirator fit testing?

Roles and responsibilities related to respirator fit testing and medical evaluation are directly related to scope of practice for practicing health care professionals (such as nurses or physicians). However, there are aspects of respirator fit testing that can be accomplished by other individuals.

Medical Evaluation and Questionnaire Requirements

When respiratory protection is required in the workplace, employers must have a respirator protection program as specified in OSHA's Respiratory Protection Standard (29 CFR 1910.134).

Confidentiality

The employer cannot review the answers on an employee's completed questionnaire. The employer MUST also make available a PLHCP to answer anyone's questions.

Profession	Administer Medical Questionnaire	Review Medical Questionnaire	Medical Evaluation	Fit Test
Farmer	X			X
Safety Officer or Manager	X			X
Extension Personnel	X			X
Veternarian	X			X
Vet Tech	X			X
Technician	X			X
Pharmacist	X	X		X
Respiratory Therapist	X			X
Licensed Practical Nurse (LPN)	X	X		X
Registered Nurse	X	X		X
Physician Assistant	X	X		X
Nurse Practitioner	X	X		X
Chiropractor	X	X		X
Physician	X	X	X	X

Before wearing a respirator, employees must **first** be medically evaluated using the mandatory medical questionnaire or an equivalent method (e.g., medical exam). The employer or individual who is required to wear a respirator must identify a **physician or other licensed health care professional (PLHCP)** to perform all medical evaluations using the **medical questionnaire** in Appendix C of the Respiratory Protection Standard or a medical examination that obtains the same information. A variety of health care professionals may provide the medical evaluation depending on the scope of practice permitted by the state's licensing, registration, or certification agencies. Each employer must check with the state licensing agency to see if other health care professionals under their state law can independently perform this evaluation or must do so under the direction of a licensed physician.

These examples illustrate how multiple partners work together to provide respiratory protection services to workers in ag-related operations:

Example # 1 ABC Seed Treatment Facility and Coop

ABC Seed Treatment Facility and Coop determines from pesticide treatment labels that their Spanish-speaking employees need a respirator fit test and implements a Respiratory Fit Test Program, since they have more than 10 employees and are considered an agribusiness (not a farm). The bilingual Safety Manager at ABC Seed Treatment Facility and Coop administers the Spanish version of the medical questionnaire. A local Registered Nurse (Licensed Health Care Professional) reviews the medical questionnaire to determine if a medical evaluation is required. A local physician does the medical evaluation for the employee(s) with the assistance of an interpreter if needed.

The bilingual Safety Manager at ABC Seed Treatment Facility and Coop is qualified to perform respirator fit testing and performs tests on employees. The Safety Manager does the work related to establishing and maintaining a Respiratory Program per OSHA requirements. This includes recordkeeping, respirator cleaning, storage and cartridge changing schedule. The Safety Manager ensures that education and training is performed in the appropriate language, and the employees know how to appropriately wear and care for their respirators.

Example #2 The Swanson Family Applies Pesticides

Farmer Swanson determines his wife and two older sons (ages 18 and 22) need a respirator fit test based on the pesticide label, since they assist with pesticides handling on the farm and he recognizes the WPS requirements. Farmer Swanson contacts his health care provider (HCP Office) to find out how to get a respiratory fit test for himself and his family members. The HCP Office discusses the need for a medical questionnaire to be completed with Farmer Swanson. They email the questionnaire to Farmer Swanson and his family members, who complete it and return it to the office.

A Registered Nurse (RN) or other Licensed Health Care Professional (LHCP) at the HCP Office reviews the medical questionnaire to determine if a medical evaluation is needed. It turns out that a local physician is needed to do a medical evaluation for Farmer Swanson but not the rest of his family members, as they do not need an evaluation based on their answers to the questions. The local physician meets Farmer Swanson, reviews the questionnaire responses and list of respirator tasks, type, frequency and duration of use, and determines restrictions for which he is cleared to wear the respirators. A LHCP at HCP Office who is qualified to do fit testing does the respirator fit testing for Farmer Swanson, his wife, and two sons. The LHCP provides Farmer Swanson and his family members with a fit test record for their records and advises them on when future fit testing may be needed. Farmer Swanson and his family are confident that they are protected from respiratory hazards when handling pesticides on the farm, and that they are using pesticides legally according to the label.

Resources

OSHA
Respiratory Protection Standards
osha.gov/respiratory-protection

CDC / NIOSH
cdc.gov/niosh/npptl/topics/respirators/disp_part/respsourcetypes.html

National Institutes of Health
ors.od.nih.gov/

Minnesota Department of Public Health
Minnesota Department of Public Health – Respiratory Protection Home
health.state.mn.us/facilities/patientsafety/infectioncontrol/rpp/index.html

Pesticide Educational Resources Collective (PERC)
pesticideresources.org/wps/

National Pesticide Information Center
npic.orst.edu/reg/wps.html

Ag Health and Safety Alliance™ and Great Plains Center for Agricultural Health - related resources
Ag Health and Safety Alliance™ Respiratory Resources
aghealthandsafety.com/respiratory/
Great Plains Center for Agricultural Health Resources
gpcah.public-health.uiowa.edu/respiratoryprotection/

Industry Resources
1. 3M Quick Reference Guide:
   multimedia.3m.com/mws/media/1658130O/quick-reference-guidequalitative-fit-testing.pdf
2. 3M Fit Testing Website
   3m.com/3M/en_US/safety-centers-of-expertise-us/respiratory-protection/fit-testing/

Medical Forms:
Appendix C to Respiratory Protection Standard; respirator medical evaluation questionnaire.
OSHA Respirator Medical Evaluation Questionnaire (Mandatory)
osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9783
This form outlines the results of the Occupational Safety and Health Administration (OSHA) Respirator Medical Evaluation and is to be filled out by a licensed medical provider based on the review of the OSHA Respirator Medical Evaluation Questionnaire.

Medical Evaluation Resources:
NIOSH Respirator Selection Logic
cdc.gov/niosh/docs/2005-100/pdfs/2005-100.pdf?id=10.26616NIOSHPUB2005100
Szeinuk, J., Beckett, W.S., Clark, N. and Hailoo, W.L. (2000), Medical evaluation for respirator use. Am. J. Ind. Med., 37: 142-157.
doi.org/10.1002/(SICI)1097-0274(200001)37:1<142::AID-AJIM11>3.0.CO;2-K
Johnson AT. Respirator masks protect health but impact performance: a review. J Biol Eng. 2016 Feb 9;10:4. doi: 10.1186/s13036-016-0025-4. PMID: 26865858; PMCID: PMC4748517.
ncbi.nlm.nih.gov/pmc/articles/PMC4748517/
Sheri Belafsky, Justin Vlach & Stephen A. McCurdy (2013) Cardiopulmonary Fitness and Respirator Clearance: An Update, Journal of Occupational and Environmental Hygiene, 10:5, 277-285, DOI: 10.1080/15459624.2013.774631
tandfonline.com/doi/abs/10.1080/15459624.2013.774631
OSHA Small Entity Compliance Guide for the Respiratory Protection Standard at
osha.gov/Publications/3384small-entity-for-respiratory-protection-standard-rev.pdf

Notes:

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Great Plains Center for Agricultural Health

Ag Health & Safety Alliance

AgHealth Central States Center for Agricultural Safety and Health