Maintaining and Fit Testing Cartridge Respirators for Pesticide Applications

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This NebGuide examines the proper way to fit test a cartridge respirator before beginning a pesticide application and how to maintain a respirator after use.

When working with any pesticide, you must follow all personal protective equipment (PPE) requirements listed on the label. This is for your safety, and also is a legal requirement for using pesticides. Some pesticides carry a risk of inhalation exposure and require the use of a respirator, such as a dust respirator, full or half face cartridge (air purifying) respirator, or self-contained breathing apparatus (SCBA). This NebGuide will focus on the half face cartridge respirator, which is one of the most common respirators used when applying pesticides.

Like other PPE, it is vital to properly maintain your respirator to ensure that it offers adequate protection when you apply pesticides. This includes testing the respirator before each use to make sure that it has a tight seal, as well as proper cleaning and storage of the respirator after each use.

Your New Respirator

When you buy a new respirator, it will come in a package with several components. These include an instruction manual, faceplate with straps, two cartridges, and extra accessories to attach for dust or particulate protection (Figure 1). Check the labels on the cartridges to ensure they provide the protection you need, whether it is against organic vapors or other particulates.

It is important to read the instruction manual thoroughly before using the respirator. The manual explains how to properly assemble, fit, maintain, and store the respirator. The most important thing to remember when using a respirator is to get a good seal. Without a good seal, the respirator will not effectively protect you from pesticide inhalation exposure.

Fit Testing

Fit testing is mandatory under Occupational Safety and Health Administration (OSHA) regulations. Fit testing must be done to determine the size of the respirator for a particular user. Pesticide applicators need to meet certain health requirements before conducting a fit test or doing work that requires a respirator. OSHA requires that an employee who will be using a respirator have a medical evaluation prior to fit testing. The employee also needs to be properly trained in respirator use. For more information about OSHA's medical evaluation questionnaire, mandatory fit test procedures, and

Figure 1. Examples of respirator packaging and instruction manual.

OSHA lists minimum requirements for respirator fit testing and initial use. For example, a new fit test may be required if there is a change in size, make, or model of the respirator you are using, or a change in user characteristics such as dental work, body weight, etc. You should always follow these guidelines.

The most important part of a fit test is obtaining a good seal. It is good common practice to test the seal on your respirator every time you put it on. Between removal, cleaning, and storage, the respirator may not fit the same, so you’ll have to readjust it before using it again. Prior to each use, check the face seal for cracks and abrasions. Check respirator assembly (components, valves, O-rings) to ensure they are intact, present, and appropriate.

To accomplish a seal check, the faceplate has to fit tightly against your face. Facial hair may prevent you from being able to get a tight seal, so you may need to shave before using a half face respirator, or choose an alternative pesticide that does not require a respirator.

There are three common ways to test the seal. Before testing, adjust the respirator so you think you have a good fit. To begin, place the respirator on your face, then pull the top (halo-shaped in some models) plastic strap and adjust it over and on top of your head. Next, connect the straps that go behind your neck, and pull the loose ends of the straps to adjust for comfort and fit. When you feel you have a tight seal, test to ensure your respirator is fitted properly (Figure 2).

Positive Seal Check

To perform the positive seal check (Figure 3), cover the exhalation valve in front of the respirator and gently exhale. If you can do this without feeling a rush of air around the faceplate, you have a good seal.

Negative Seal Check

To perform the negative seal check (Figure 4), cover the intake portion of each of the two cartridges with your hands and inhale gently. Note that you also can do this test without
the cartridges by simply covering the inlet holes and testing the seal. If you have a good seal, you should not be able to pull any air through the seal against your face. If you can pull air, check carefully around the seal for damages or obstructions. If you find breaks or damaged portions of the seal, replace the respirator. If you are able to clear obstructions and make additional adjustments to strengthen the seal, simply retest the unit. In some cases, if you can’t find a solution, you will need to replace the respirator seal or the entire unit.

Ampule Test

An ampule is a small, sealed vial that can be purchased from many online suppliers. Ampule testing for respirator fit is one example of several procedures that may be required by OSHA. In the ampule test (Figure 5), you break an ampule designed for this purpose and see if you can detect an odor (often smelling like concentrated banana) through the respirator. If you detect an odor, you know that your seal isn’t adequate and you’ll have to make additional adjustments. Make sure to test the ampule across all portions of the respirator seal. You also should consider simulating common working motions such as moving your head up and down and side to side to test field operability.

Prior to Fit Testing

1. Remove respirator and cartridges from their packaging.
2. Place the mask in front of you with the cartridge holes facing toward you.
3. Attach each cartridge by lining it up with one of the holes, inserting it, and turning it counterclockwise until it locks firmly in place.
4. Perform the fit test and seal check.

Maintaining Your Respirator

When finished with your respirator, clean and store it properly after each use so that it’s in good condition for the next use. After removing your respirator, remove the cartridges. They generally unthread, bend, or snap out of the faceplate. If the cartridge seating is damaged during removal, do not attempt to repair or bend it back in place — simply replace the cartridge. Store cartridges in either the original respirator packaging or a resealable zipper storage bag when not in use. The best type of storage container is one with an airtight seal. Cartridges absorb pesticides and other organic vapors when exposed to air. You can extend their life span by storing them properly whenever they are not in use. The respirator package or resealable zipper storage bag provides ideal storage because it offers an airtight seal that will help preserve the cartridges by keeping organic vapors out. It is also a good idea to mark the storage container with the purchase date of the cartridges and a running tally of the total number of hours used (Figure 6).

After removing and storing the cartridges, wash the faceplate with soapy water and either air or towel dry before storing it in a clean, dry container with a good seal such as a resealable zipper storage bag or a tight-sealing plastic storage container until the next use. Store the respirator in a way that preserves the shape and integrity of the respirator, protecting it from distortion, contamination, and extreme temperatures.
Replacing Your Cartridges

A respirator cartridge has a limited life span, which is greatly affected by the conditions of use, such as the temperature, humidity, work efforts of the user, and the chemical concentration and type of chemicals for which the cartridge is used. Many respirator manufacturers have online calculators in which you can enter this information to determine cartridge life. Consult the manufacturer’s website for such software. Keep a log of respirator usage to know how long the cartridges have been used. For more information and a sample log, see the UNL Safe Operating Procedure “Respiratory Protection — Air Purifying Respirators: Cartridge Change Schedules” at http://ehs.unl.edu/sop/RPP_SOP_Cartridge_Change_Log.pdf.

Proper storage will help preserve cartridges for as long as possible, but eventually you will need to replace them.

Also, be sure to inspect the respirator for any holes, damage, or wear, and replace it if necessary (Figure 7).

Pay attention to when a cartridge’s life is spent and be sure to replace as necessary. Cartridge life may be reduced if exposure to organic vapors is extensive and occurs over a short time span. Always replace cartridges immediately if you can smell pesticide odors when using the respirator. If you are unsure of the last time a cartridge was used or if the total hours of use have not been recorded, replace it; when in doubt, replace.

Your new cartridges should be the same type as those you are replacing. Cartridges are color coded depending on what particulates they filter. For example, organic vapor cartridges are black and have “organic vapors” written on the label (Figure 8). A cartridge that filters organic vapors as well as pesticide dusts, mists, and fine particles (using a P100 filter) will be magenta and black.

To learn more about maintenance and fit testing of your respirator, refer to the user’s manual that came with your respirator, or view the University of Nebraska–Lincoln Extension video, “Cartridge Respirator Use” at http://www.youtube.com/user/UNLExtensionPSEP.

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