



Respirators for Pesticide Applications¹

Frederick M. Fishel²

This guide provides an explanation for respirator use while working with pesticides.

Respirators are the most specialized piece of personal protective equipment for working with pesticides and proper selection is complicated. Specific information on choosing the appropriate respirator will be supplied by pesticide labels. Use only respirators approved by the National Institute of Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA). Approved respirators will carry a "TC" number prefix, which signifies they have been tested and certified for a specific level of protection. If you plan to purchase a new respirator, a particulate respirator that formerly carried a TC-21C NIOSH prefix may carry a TC-84A prefix. NIOSH has developed a new set of regulations in 42 CFR 84 (also referred to as "Part 84") for testing and certifying nonpowered, air-purifying, particulate-filter respirators. The new Part 84 respirators have passed a more demanding certification test than the old respirators (e.g., dust and mist [DM], dust, fume and mist [DFM], spray paint, pesticide, etc.) certified under 30 CFR 11 (also referred to as "Part 11").

Particulates are solid particles such as dusts, mists, and fumes. Newer pesticide labels that specify organic vapor-removing cartridge respirators, once designated only as TC-23C, will also list which filters or pre-filters can be used with the respirator. The filters are identified by codes such as an HE, N, R or P, which indicate the level of oil resistance offered by the filter. "N" filters are not resistant to oils, but are excellent for use with dusts and granular formulations. "R" and "P" filters are either oil-resistant (R) or oil-proof (P). HE filters refer to "high efficiency" filters for powered-air purifying units, which can be used with oils. Manufacturers will designate a number that follows the HE, N, R, or P on their products, and this number is an indication of the trapping efficiency. For example, a particulate respirator or filter with the N95 designation would be expected to have 95% efficiency in its trapping capacity. Pesticide label recommendations generally instruct the user to have a P100 filter with the chemical cartridge respirator when handling and applying oil-based pesticides.

One of the two common types of respirators is the air-purifying respirator. Air-purifying respirators are available that cover the entire face; there are also

1. This document is PI-77, one of a series of the Pesticide Information Office, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date October 2005. Visit the EDIS Web Site at <http://edis.ifas.ufl.edu>.

2. Frederick M. Fishel, Associate Professor, Agronomy Department, and Director, Pesticide Information Office; Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL 32611.

The use of trade names in this publication is solely for the purpose of providing specific information. UF/IFAS does not guarantee or warranty the products named, and references to them in this publication does not signify our approval to the exclusion of other products of suitable composition. Use pesticides safely. Read and follow directions on the manufacturer's label.

less expensive half-masks that cover the nose and mouth. These respirators should be used only where there is sufficient oxygen. Air-purifying respirators remove airborne contaminants as air enters the respirator through chemical cartridges or mechanical filters. The chemical cartridges are filled with activated carbon, which has a very high absorption capacity for gases and vapors. Chemical cartridges are color-coded which indicates the uses for which they were designed. A description of these codes is listed in Table 1. Mechanical filters provide protection by trapping particulate matter in the porous filter material.

Table 1. Chemical cartridge color codes.

Color	Protects against
Black	Organic vapors (pesticides except fumigants unless allowed on label), paint spraying (except isocyanate-containing paints), fumigation
Green	Ammonia: anhydrous or from livestock confinement
Yellow	Acid gases, such as chlorine and other disinfectants
Olive*	Organic vapors, ammonia, and acid gases
Pink	Dusts and welding fumes

Most air-purifying respirators (Figure 1) operate under negative pressure; that is, they rely on the power of the wearer's lungs to pull air through the filter elements. These include half-mask dust/mist respirators, half-mask dual-cartridge respirators, full-face dual-cartridge respirators, and canister-type gas masks. Dust/mist respirators (Figure 2) and some half-mask dual-cartridge respirators are disposable. The only air-purifying respirator that operates under positive pressure is the powered air-purifying respirator (PAPR). It has a fan that pulls air through the filters and circulates it over the wearer's face. Air-purifying respirators vary widely in price.

The second basic type of respirator is the atmosphere-supplying respirator. This kind of respirator supplies an independent source of breathable air and is used in conditions where oxygen is deficient or the applicator is exposed to high concentrations of very toxic pesticides in enclosed areas. Breathable air is supplied to the wearer from



Figure 1. Air-purifying respirator.



Figure 2. Dust-mist respirator.

an independent source through an air line, or the wearer carries oxygen in a tank. These respirators are relatively expensive and should be serviced and inspected by qualified personnel.

An applicator should perform a fit test to determine correct size of a respirator facepiece because a respirator that does not provide a proper seal is of little value. OSHA mandates that a fit test be performed *every time* a person puts on a respirator. Instructions for conducting fit tests generally accompany half-mask and full-face respirators.

Chemical cartridges should be replaced according to the manufacturer's recommendations or the pesticide label or when odor or irritation is noticed. Pre-filters will extend the life of chemical cartridges in dusty conditions. Mechanical filters should be replaced when breathing becomes difficult or the filter is damaged or as specified by the

manufacturer or the pesticide label. If no instructions are provided, replace cartridges and filters when the workday is over.

Additional Information

Lehtola, C.J., C.M. Brown and W.J. Becker.
2001. Personal protective equipment: OSHA
standards 1910.132-137. UF/IFAS EDIS
Document AE271. <http://edis.ifas.ufl.edu/OA034>.

Nesheim, O.N, F.M. Fishel and M.A. Mossler.
2005. Toxicity of pesticides. UF/IFAS EDIS
Document PI-13. <http://edis.ifas.ufl.edu/PI008>.