



Center for Agricultural Business

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Respiratory Protection Equipment

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Introduction

The human respiratory system, and its association with the circulatory system, represents the most direct route of toxic entry into the body. This section will list and briefly describe respiratory hazards and the type of respirator necessary for the specific contaminant which may be encountered. Proper hazard control should start at the engineering and design level and should include 1) substitution of a less harmful material or substance for a toxic one; 2) isolation or encapsulation of the process; and 3) ventilation of the contaminant before the worker is exposed. Hazards can be classified as follows:

- Gas and vapor contaminants
- Oxygen deficiency:
 - Immediately dangerous to life or health (IDLH)
 - Not immediately dangerous to life or health
- Particulate contaminants (dust, fog, fume, vapor, mist, smoke, and spray)
- Combination of gas, vapor, and particulate contaminants.

Laws and regulations

CAL/OSHA - General Industry Safety Order 5141 - Requires prevention of worker exposure to harmful levels of airborne contaminants.

Respirator selection

OSHA Standard 1910.134. States that respirators shall be selected on the basis of the hazards to which workers are exposed, and that ANSI Z88.2- 1969 shall be used for guidance in their selection. For specific respiratory hazards, specific instructions for respiratory selection are given in other OSHA regulations (e.g., Asbestos, 1910.1001). The trend is toward regulations that are specific to the contaminant in question. OSHA has a new standards list called the Respiratory Selection Guide which is very useful for this type of application.

Class 1 - Air purifying devices

The air purifying device cleans the contaminated atmosphere. This device is limited in its use to those environments where there is sufficient oxygen to sustain life. This is strictly a device meant as a source of diluting air that is relatively contaminant free.

A. Mechanical-filter respirators - These offer respiratory protection against airborne particulate matter, including dust, mist, metal fumes, and smoke. The NIOSH certifies mechanical filter respirators under subpart K of title 30 CFR, part II.

B. Chemical cartridge respirators - These are used to protect against concentrations between 10 and 1,000 ppm (parts per million) depending on the contaminant. These respirators are not to be used in IDLH environments. Note: Responsibility for testing respirators for agricultural chemicals belongs to NIOSH-MSHA (Title 30, CFR, part II, subpart M). Approved combination type units for pesticides are now available.

C. Gas masks - These are used for respiratory protection against certain gases, vapors, and particulate matter that otherwise may be harmful to life or health. It is important to note that their use should be restricted to atmospheres which contain sufficient oxygen to support life. Gas masks should be used for escape only from IDLH atmospheres, but never for entry into such environments. Note: If a specific exposure is expected to exceed an allowable limitation, only a self contained breathing apparatus (SCBA) should be used.

Class 2 - Atmosphere- or air-supplying devices

This is a class of respirators that provides a respirable atmosphere independent of the ambient air.

A. Self Contained Breathing Apparatus (SCBA) This provides complete respiratory protection against toxic gases or an oxygen deficient environment. The user of this type of respirator is independent of the surrounding atmosphere because he or she is breathing with a portable system that admits no outside air. The apparatus provides the air supply.

Class 3 - Combination air purifying and atmosphere supplying devices

This device is a combination of an air-line respirator with an auxiliary air-purifying attachment, which provides protection in the event that air supply fails. The most popular versions are those in which the air purifying element is a high efficiency filter. This filter is approved for dusts, fumes, and mists that have a permissible exposure limit (PEL) of less than 0.05mg/m³.

Training programs

CAL/OSHA Respiratory Protection Program GISO 5144. This document summarizes the basic components of a respiratory protection program. To properly use any respiratory protective device, it is essential that the operator be properly instructed in its use. OSHA requires that employees be trained in the use of the particular respirator assigned to them.

Many companies have their employees sign a document attesting to their having completed a training session.

OSHA requirements for a respiratory protection program

The OSHA regulation lists several tenets of a respiratory protection program. The key element of any program starts with an assessment of the inhalation hazards present in the workplace. This initial step involves gathering the necessary toxicological, safety, and research data on the substances in the atmosphere. A simple questionnaire can be obtained to assist in gathering the pertinent information about the exposure conditions.
