

# **Respiratory Protection Program**

*The OSHA respiratory standard requires contractors to develop and implement a written respiratory protection program for situations in which PELs of airborne contaminants could be exceeded or when the employer requires use of respirators by workers. See also the chapter on Confined Spaces.*

*The written program also must address voluntary respirator use; respirator selection; medical evaluations; fit-testing; use of respirators; user seal checks; maintenance and care of respirators; identification of filters, cartridges and canisters; employee training; and program evaluation. The standard requires the respiratory program to be administered by a program administrator and updated to reflect the changing workplace conditions that affect respirator use. The standard sets out several mandatory components within the aforementioned program categories including fit testing, seal-check and cleaning procedures in addition to a medical evaluation questionnaire and voluntary-use procedures that are compiled in appendices to §1910.134.*

*Many of the elements listed may not need to change for each project. For example, medical evaluations, fit-test procedures, schedules and procedures for maintaining respirators, air-quality requirements for supplied-air respirators, employee training and program evaluations often can remain consistent. The only change that may be needed in a work-site specific written program is the procedure for respirator selection. (The procedures for respirator selection are addressed later in this chapter.)*

*When employees voluntarily wear respiratory protection, the employer still must establish and implement written respiratory program components related to the medical evaluation of a worker's ability to wear the respirator safely. Elements relating to cleaning, storing and maintaining respirators must be addressed, as well. Employees must be provided with copies of the information contained in Appendix D of the standard titled "Information for Employees Using Respirators*

## **RESPIRATOR SELECTION**

*When Not Required Under the Standard.” When filtering face pieces (dust masks) are worn voluntarily, employees only must be given the Appendix D information; however, when filtering face pieces are required by a contractor, the entire respiratory protection standard applies—that is, medical evaluation, fit testing and other components of a written respiratory program must be in place.*

*Although OSHA does not require specific training or qualifications for the program administrator, this person must know the standard and have enough experience or training to be able to enforce the written program and conduct evaluations of the program’s effectiveness.*

## **Respirator Selection**

*The standard requires that the correct respiratory protection be selected to provide adequate protection against airborne hazards and that only respirators certified by the National Institute for Occupational Safety and Health (NIOSH) be used. Contractors are required to evaluate the respiratory hazards in their workplaces to determine the identity of contaminants, chemical states and physical forms. If an employer cannot identify or reasonably estimate employee exposures to respiratory hazards, the employer must consider the atmosphere “Immediately Dangerous to Life or Health” (IDLH).*

*IDLH atmospheres require a full-face piece, pressure demand self-contained breathing apparatus (SCBA) or supplied-air respirator (SAR) with self-contained auxiliary air supply. Under most circumstances in roofing where respiratory hazards have been evaluated, SCBAs and SARs are not needed—other respirators described here will be adequate. An exception may be when employees need to enter a confined space, such as a tanker, because an oxygen-deficient atmosphere and other respiratory hazards may exist. See the NRCA Safety Manual chapter on confined space.*

### **Respirator Selection—Hazard Assessment**

*Hazard assessments must be conducted to select the appropriate respirators for particular environmental conditions. A contractor should begin the hazard assessment by obtaining information from the material safety data sheets (MSDSs) supplied by product manufacturers. The MSDSs provide health hazard information, the nature of the chemicals in the product, the PEL and other valuable information.*

*To quantify the airborne concentration of a contaminant, air samples must be collected, and subsequent testing of samples will aid in selecting the type of respirator that is needed, if any.*

*Two methods of determining whether gas or organic vapor contaminants are present are through passive monitoring badges and colorimetric tubes.*

*Colorimetric tubes, which are available through most safety supply companies, provide the user with an instantaneous reading. These readings, however, can be inaccurate.*

*The passive monitor badges are a good alternative for organic vapor detection and are more accurate, but they do not provide an instant reading and must be sent to a lab for analysis.*

*Air-sampling pumps are capable of detecting airborne contaminants such as asbestos fibers or silica particles along with toxic gases or harmful vapors. Industrial hygiene firms or environmental test labs often are best-suited for analyzing results from air sampling and providing solutions for particular exposures.*

*After a hazard assessment has been completed, OSHA requires employers to implement one of the following methods, ranked by order of preference, to reduce employee exposures:*

- 1. Engineering controls*
- 2. Administrative/work practice controls*
- 3. Personal protective equipment (PPE), such as respirators*

*An example of an engineering control is installation of a ventilation system which may work well in shops or manufacturing plants but are impractical in the construction industry. However, sometimes fans on rooftops may provide adequate ventilation. Another example of engineering control in the roofing industry that may eliminate a ventilation hazard is the use of fume-recovery units on kettles during built-up roofing applications.*

*If an engineering control can't be found, an administrative work practice control must be tried. An example of a work practice solution is keeping the lid closed on a kettle to keep fume exposure to a minimum. An example of an administrative control is rotating workers out of a hazardous atmosphere, when feasible, to keep the exposure levels below the PEL.*

*When no other solution can be found, PPE must be used. This is the least preferred method to use because the exposure hazard is not removed completely and exists in the area surrounding the worker protected by PPE.*

## **Respirator Types**

*Respiratory selection is critical. To select the proper respirator, it must be understood that respirators only reduce exposures to airborne contaminants. They do not eliminate them. Based on how they operate, respirators are air-purifying (APR), supplied-air (SAR) or a combination of the two.*

*Most respirators have an inlet covering that acts as a barrier against respiratory hazards and connects the respirator to an air purifier or source of breathable air. Examples of inlet coverings include face pieces, helmets or hoods. Most inlet coverings fall under one of two categories:*

*Tight-fitting: A tight-fitting covering, called a face piece, forms a complete seal on the wearer's face. The face piece usually is made of a molded flexible elastomer (an elastic substance that resembles rubber) and available in three basic types typically used in roofing: quarter-mask, half-mask and full-mask.*

*Loose-fitting: A loose-fitting covering doesn't form a complete seal and may cover a wearer's head or extend over the shoulders. A flexible tube usually supplies breathable air to a loose-fitting inlet covering, which can be used only with powered air-purifying respirators (PAPRs) or SARs.*

## **Air-purifying Respirators**

*APRs use purifying elements to clean the air a wearer is breathing. These purifying elements are:*

- *Filters that remove particulate matter*
- *Cartridges that remove gas or vapors*
- *Filter and cartridge combinations that remove particulates, gas and vapors*
- *Canisters that remove gas or vapors (impractical for construction because of bulkiness)*

*As air passes through a purifying element, contaminants are removed from the air. Wearers operate a respirator by inhaling, which creates a negative pressure in the face piece that allows air to pass through the purifying element.*

*PAPRs operate similarly, but a pump is used to draw air in through the purifying element and then into the face piece.*

*A restriction to these types of respirators and their purifying elements is that they cannot be used in, nor do they eliminate the hazards of, oxygen-deficient or IDLH atmospheres. An oxygen-deficient atmosphere is an atmosphere that contains less than 19.5% oxygen, which can cause death.*

## **Filters**

*In 29 CFR 1910.134, OSHA defines a filter as a component used in respirators to remove solids or liquid aerosols (e.g., particulates) from inhaled air.*

*NIOSH, as the certifying agency for all industrial respirators, updated the testing and certification standard for respirators on July 10, 1995. The revised standard, 42 CFR Part 84, changed the manufacturing and certification requirements for respirator filters. When protection against airborne particulates is needed, OSHA requires either a high-efficiency particulate air (HEPA) filter, certified under 30 CFR Part 11, or a filter that has been certified under 42 CFR Part 84. NIOSH publishes the 2004 Respirator Selection Logic that is helpful in determining the proper respirator for the applicable hazard. It can be downloaded at [www.cdc.gov/](http://www.cdc.gov/).*

*Under 42 CFR Part 84, particulate filters will have N, P or R designations, each with three efficiency levels. Respirators with N100 (99.97 percent efficient), N99 (99 percent efficient) and N95 (95 percent efficient) filters may be used for any solid or non-oil-containing particulate contaminant. Respirators with R and P series filters may be used for any particulate contaminant, including oil aerosols.*

*It is important to note that N and R series filters might have usage limitations because contaminants may degrade the filter media. Filters with P designations have longer usage limitations. Usage limitations are designated by respirator manufacturers. Filters must be replaced whenever particulate buildup causes breathing difficulties or filters become damaged or defective.*

## **Cartridges**

*OSHA defines a cartridge as a container with a filter, sorbent, catalyst or combination of these items that removes specific contaminants from air passed through the container. These cartridges must be equipped with end-of-service life indicators (ESLIs). An ESLI is a component of the cartridge that indicates, typically by changing colors, when the cartridge needs to be replaced.*

*Because most cartridges used by roofing contractors do not have ESLIs, OSHA requires “change-out,” or replacement, schedules to be developed. The purpose of change-out schedules is to replace cartridges before they reach the end of their service lives. To develop a change-out schedule, contractors can use objective data obtained from trade associations or respirator manufacturers, if available.*

*Some manufacturers have downloadable programs for estimating times for change-outs on their Web sites. Information such as humidity, contaminant concentration, an employee’s estimated workload and atmospheric pressure must be ascertained and entered into the program by the contractor. It is recommended that all hazard warnings associated with the program be read and followed when these programs are used.*

*As an alternative, OSHA published a guide for estimating times for organic vapor cartridge change-outs. It states the following:*

- *If a chemical's boiling point is greater than 158 F and the concentration is less than 200 parts per million (ppm), an eight-hour service life at a normal working rate can be expected.*
- *Service life is inversely proportional to work rate. (This means that as the work rate increases or if it is already high, the length of time the cartridge will remain effective will be less than when work rates and, consequently, breathing rates are lower.)*
- *Reducing concentrations by a factor of 10 will increase service life by a factor of five.*
- *Humidity above 85 percent will reduce service life by 50 percent.*

*Cartridge respirators have significant limitations, which can prohibit their use. NIOSH prohibits the use of cartridge respirators when working with some specific chemicals because not all gases and vapors are removed by a cartridge's medium. The manufacturer should be consulted for final determination of applicability of cartridge use. Contractors must ensure all filters and cartridges used in the workplace are labeled and color-coded with the NIOSH-approval label, which must remain legible and intact.*

### ***Filtering Face Pieces (Dust Masks)***

*NIOSH's certification standard for respirators addresses dust masks and refers to them as filtering face pieces. OSHA defines a filtering face piece as a negative-pressure particulate respirator with a filter as an integral part of the face piece or the entire face piece composed of the filtering medium. These ordinarily are disposable, low-cost respirators for protection against particulates when exposures are below the PEL. Some come with integrated exhalation valves and are rated under the N, P or R standards at 95, 99 or 100 efficiency levels.*

*If a contractor elects to make use of filtering face pieces mandatory, then all the requirements of the OSHA respiratory protection standard apply. If employees voluntarily choose to wear the respirators, the contractor must make Appendix D of the standard available to them. A copy of the appendix is with the sample written program at the end of this chapter.*

### ***Supplied-air Respirators***

*There are three basic types of atmosphere-supplying respirators:*

1. *Supplied-air respirators*
2. *Self-contained breathing apparatus*
3. *Combination of the two*

*These respirators are more sophisticated and generally never used in the roofing industry. They also require extensive training before use. The only application for these respirators may be when cleaning out a tanker or similar confined spaces. The units are supplied with breathable air from a stationary source, such as a compressor. The compressor must be able to provide breathable air that meets the American National Standards Institute (ANSI) grade-D breathing air requirements.*

*As an example, some roofing contractors who own asphalt or coal-tar tankers may depend on their crews to clean interior surfaces of the tanker. This task must be performed with extreme caution. A typical air-purifying respirator will not provide adequate protection against a hazard inside a tanker, such as oxygen deficiency. Air-purifying respirators only clean the air as it is inhaled; they cannot supply oxygen. More sophisticated types of respiratory protection, such as SCBAs, may be required to ensure adequate oxygen supply to a worker. The best way to determine the type of respiratory protection needed is to determine the type of atmosphere inside the tanker through the use of air-monitoring equipment, such as gas detectors. In addition to the respiratory requirement, there are requirements for permit-required confined space entry. That standard is codified at 29 CFR 1910.146 and discussed fully in another chapter of this manual.*

*Supplied-air respirators are included in the sample written program. If a contractor never uses supplied-air respirators, this portion should not be included in the company's written program.*

## **Assigned Protection Factors**

*When selecting air-purifying respirators, it is important to select those that are NIOSH-certified. It is also important to consider assigned protection factors (APFs) when selecting respirators. APF is the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements an effective respiratory protection program. APFs are listed in Table 1 of 1910.134(d). Because different types of respiratory equipment provide different degrees of protection, NIOSH and ANSI have designated APFs to the classes of respirators. OSHA enforces the NIOSH APFs in Table 1 of 1910.134(d) of the respiratory protection standard.*

*OSHA will promulgate its own APFs in the near future. In the interim, OSHA expects contractors to use the best available information when selecting respirators, which can be obtained from either ANSI Z 88.2-1992 APFs or NIOSH APFs; however, in the preamble of the standard, OSHA states that it will enforce the NIOSH APFs. Whenever there is an OSHA-specific standard, such as for asbestos, the APFs listed in the respirator-selection tables of the asbestos standard must be followed if the contractor's activities fall within the scope of that particular standard.*

*The two basic types of respirators used in the roofing industry are full-face and half-mask. Both NIOSH's and ANSI's APFs for half-mask respirators are 10 times the PEL. NIOSH and OSHA APFs for a full-face respirator are 50 times the PEL. The full-face respirator covers the eyes, nose and mouth, while the half-mask respirator only covers the nose and mouth. Both respirator types must be equipped with cartridges and/or filters that remove gases, vapors and particulate contaminants.*

## **Medical Evaluations**

*Respirator use puts a physical burden on the human body; prior to use of a respirator, a worker must be declared medically fit to wear one through a medical evaluation.*

*The medical evaluation procedure requires:*

- *The employer identify a physician or other professional licensed health care professional (PLHCP) to evaluate the employee using a medical questionnaire or initial medical examination*
- *The information obtained by questionnaire or examination must answer the questions laid out in the OSHA questionnaire in Appendix C of 1910.134.*

*Regardless of how a contractor chooses to have employees evaluated, he or she is required to provide supplemental information to the PLHCP before final determinations are made. This supplemental information includes:*

- *Type and weight of respirator to be used*
- *Duration and frequency of use*
- *Expected physical work effort*
- *Whether additional personal protective equipment (PPE) is to be worn*
- *Temperature and humidity extremes*
- *A copy of the written program and the medical evaluation portion of the standard*

*A follow-up medical examination is required if certain questions are answered "yes" on the questionnaire or the initial examination warrants it. Further evaluations are needed when any of the following occurs:*

- *An employee reports medical symptoms that are related to ability to use a respirator.*
- *A PLHCP, supervisor or program administrator informs the contractor that the employee needs reevaluation.*



- *Information from the respiratory protection program, including observations made during fit-testing and program evaluation, indicates a need for reevaluation.*
- *There is an increase in the physiological burden placed on the employee from temperature changes, changes in PPE, etc.*

## **Fit Testing**

*Fit testing is required before any employee wears a respirator. A fit test allows an employee to select a respirator based on comfort, making sure the respirator fits correctly on his or her face.*

*Either a quantitative fit test (QNFT) or qualitative fit test (QLFT) must be conducted to ensure the proper make, model, size and style of respirator is selected by an employee. Appendix A of standard 29 CFR 1910.134 provides protocol that must be followed when conducting the fit testing. A QLFT involves the introduction of a gas, vapor or aerosol test agent into an area around the head of a person wearing the respirator. If the person can detect the presence of the test agent through smell, taste or irritation, the face piece is inadequate. If the test agent is not detected, the respirator is the correct size, make, model and style for that person.*

*A QNFT is a type of fit test that actually detects the amount of air leakage into a respirator. This type of fit testing procedure requires appropriate instrumentation.*

*Additional fit tests are required:*

- *When a different face piece, size, make or model is used*
- *When the employee reports or the contractor, PLHCP, supervisor or program administrator observes changes in the employee's physical condition that could affect the fit of the respirator*
- *At least annually*

## **Respirator Use**

*Contractors are required to develop and implement procedures for the proper use of respirators. The procedures must address situations, such as facial hair, where face piece-seal leakage can occur. Facial hair, such as beards, will not allow a respirator to seal tightly, rendering the respirator useless. Other issues may include weight loss or gain of 10 or more pounds, scars that might interfere with the seal and new use of dentures.*

*The procedures must prohibit employees from removing their respirators in hazardous atmospheres, as well as address the methods for performing user seal checks each time a respirator is put on. The user seal check is performed to ensure the respirator is sealed tightly to the face. This is accomplished by*

*covering the exhalation valve of the respirator and gently exhaling. A slight positive pressure in the face piece will build, and if it is sealed correctly to the face, air will not escape. Next, the user must cover the inhalation valves by covering the cartridges or inhalation valves with the palms of his or her hands, inhaling to create slight negative pressure and holding his or her breath for 10 seconds. If no air enters the face piece after 10 seconds, the respirator's seal is adequate. Mandatory Appendix B-1 explains the user seal-check procedure.*

*Contractors also are required to ensure continued respirator effectiveness by reevaluating whenever there is a change in work-area conditions. Employees must be allowed to leave the respirator-use area at any time they feel it is necessary to wash their hands and face because of increased irritation. Also, they must be allowed to leave the area when they detect vapor or gas breakthrough, changes in breathing resistance or face-piece leakage.*

## **Respirator Maintenance and Care**

*Contractors must provide for the cleaning and disinfecting, storage, inspection and repair of all respirators. When a respirator is assigned to an employee, the respirator must be cleaned as often as necessary to keep it sanitary. If the same respirator is used by multiple employees, it must be cleaned and disinfected after each individual's use. Also, the respirator must be cleaned and disinfected each time it is used for fit testing.*

*Respirators must be stored in a clean area away from contaminants, dust, sunlight and other potentially damaging conditions. Usually, an inexpensive airtight plastic container will achieve this, provided it is kept out of sunlight and extreme temperatures.*

*Inspections must be conducted on each respirator before each use and during cleaning. These inspections must include a check of respirator function on areas such as the face piece, head straps, valves and cartridges. The respirator must also be inspected for the material's pliability, determining the degree of deterioration exhibited on the face piece and other components.*

*If during the inspection a defect is detected, the respirator must be removed immediately from service and either repaired or discarded. If it is repaired, only manufacturer's parts for the specific type of respirator must be used.*

## **Training**

*Each employee required to wear a respirator must be trained before its first use. The training must be comprehensive and repeated annually or more often, if necessary. This training must include:*

- *Limitations and capabilities of the respirator*

- *Respirator use during emergencies or when a respirator malfunctions*
- *Reasons why respirators are required*
- *How improper fit, usage and maintenance can adversely affect the respirator*
- *How to inspect, put on and remove, use and check the seals of the respirator*
- *Maintenance and storage procedures*
- *How to recognize medical symptoms that limit or prevent the use of respirators*
- *The requirements of standard 29 CFR 1910.134*

## **Program Evaluation**

*The written respiratory program must be evaluated by the program administrator to determine if it is being properly implemented. Employees should be consulted in an effort to determine its effectiveness and identify problems with the program. If any problems are noted, they must be corrected and the changes reflected in the program.*

## **Record Keeping**

*Medical evaluations must be kept by a contractor for 30 years, in accordance with the requirements in 29 CFR 1910.1020, "Access to Employee Exposure and Medical Records." Fit-test records should be kept for the current year. When a new fit test is performed, the old fit test can be discarded.*

## **Appendixes**

*The standard has five appendixes, all of which are mandatory. Appendix A describes the OSHA-accepted fit-testing procedures for QNFT and QLFT methods. Appendix B has two sections, B-1 and B-2. Appendix B-1 addresses the user seal-check procedures, and B-2 addresses respirator cleaning procedures. Appendix C is the OSHA respirator medical evaluation questionnaire. The medical examination is required to address the same information on the questionnaire. Appendix D is an information sheet that must be given to employees when they voluntarily use respirators.*

## **Substance-specific Standards**

*The new standard affects the 29 substance-specific standards of Subpart Z, Toxic and Hazardous Substances. OSHA's goal is to make each substance-specific standard consistent with the new respiratory standard. Previously, most of the standards had different fit-testing protocols. To make compliance easier, OSHA withdrew each of those requirements and replaced them with new ones in the new standard.*

*In addition to Subpart Z, the following construction standards have been affected by the new changes:*

<i>29 CFR 1926.57</i>	<i>Ventilation</i>
<i>29 CFR 1926.60</i>	<i>Methylenedianiline</i>
<i>29 CFR 1926.62</i>	<i>Lead</i>
<i>29 CFR 1926.103</i>	<i>Respiratory Protection</i>
<i>29 CFR 1926.800</i>	<i>Underground Construction</i>
<i>29 CFR 1926.1101</i>	<i>Asbestos</i>
<i>29 CFR 1926.1127</i>	<i>Cadmium</i>

*The remainder of this chapter includes a sample respiratory protection program. If a contractor performs a hazard analysis and determines respirators are not required, the respiratory protection program should not be included with the overall safety program.*

*If respirators are used, even on occasion, it is important to include them in the safety program. The information pertaining to SARs and SCBAs is included for those contractors who use them. If they are not used, do not include that information in the written program.*