Respiratory Protection

The Occupational Safety and Health Administration (OSHA) construction industry regulations relating to respiratory protection (29 CFR 1926.103) are actually found under the general industry regulations applicable to respiratory protection in 29 CFR 1910.134. Those provisions mandate respiratory protection if engineering controls are not feasible or are ineffective. OSHA requires methods such as substituting less toxic materials or ventilating the work area to prevent atmospheric contamination. When engineering controls fail to reduce employee exposures to harmful contaminants below the permissible exposure limit (PEL) of a contaminant, respiratory protection and accompanying program elements must be put in place.

Written 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

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/.

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:

29 CFR 1926.57	*Ventilation*
29 CFR 1926.60	*Methylenedianiline*
29 CFR 1926.62	*Lead*
29 CFR 1926.103	*Respiratory Protection*
29 CFR 1926.800	*Underground Construction*
29 CFR 1926.1101	*Asbestos*
29 CFR 1926.1127	*Cadmium*

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.

Sample Program

Respiratory Protection Program

Purpose

[Company name] is committed to providing a safe and healthy work environment for its employees. On occasion, employees may be exposed to airborne contaminants. In an effort to limit their exposure, [company name] will do the following:

- *Evaluate respiratory hazards in order to select appropriate respiratory protection.*
- *Ensure employees are medically able to wear respirators.*
- *Fit test employees with appropriate respirators.*
- *Establish procedures to ensure employees properly care for and maintain their respirators.*
- *Ensure high-quality breathing air is supplied for the air-supplying respirators.*
- *Conduct continuing respirator training.*
- *Evaluate the program periodically to ensure its effectiveness.*

Scope and Application

This program applies to any employee who is required to wear a respirator during normal work activities and emergencies. Any employee who requests a respirator when its use is not required must comply with the medical evaluation and cleaning, maintenance and storage elements of this program. Any employee who asks to wear a filtering face piece, or dust mask, is not subject to the medical evaluation or cleaning, maintenance and storage requirements of this program.

This program will be updated to reflect changes in workplace conditions and processes that affect employees' respirator use.

Employer and Employee Responsibilities

Program Administrator

The respiratory program administrator for [company name] is [name]. This person's responsibilities include:

- *Establishing procedures for selecting respirators*
- *Arranging employee medical evaluations*
- *Developing procedures for fit testing all respirators*
- *Developing procedures and schedules for inspecting, cleaning, maintaining, repairing and storing respirators*
- *Developing procedures for self-contained breathing apparatus, if used*
- *Ensuring employees are trained*
- *Evaluating the program*

Employer

[Company name] will provide appropriate respirators when needed to protect the health of its employees. As a part of the written respiratory protection program, work-site procedures will be provided for all employees required to wear respirators.

Employees

Employees who wear respirators must use them in accordance with the instructions and training provided.

Employees must maintain their respirators properly and not alter them in any way.

Any employee wearing a respirator in a hazardous area must take periodic breaks in a safe area to rest and wash the face piece if it needs cleaning. If the respirator does not work properly on the job, the employee must go to a safe area immediately and report the problem to the program administrator.

Program Elements

Hazard Identification and Evaluation

[Company name] will identify and evaluate all workplaces for respiratory hazards. The evaluation will include an estimate of employee potential exposure to the hazards and the identity of each hazard's chemical state and physical form.

The program administrator will arrange these evaluations, and the information will be used to select and assign the proper respirators to employees.

Respirator Selection

The program administrator will select respirators by determining whether there is a potential for employees to be exposed to contaminants above their permissible exposure limits (PEL) or there is a specific reason an employee needs such protection. Only filters and/or chemical cartridges matched to expected atmospheric contaminants known to be present will be used. A variety of respirator sizes will be kept in stock to ensure proper fits for all employees.

The program administrator is also responsible for selecting appropriate respirator filters and/or cartridges based on a review of material safety data sheet (MSDSs) or other relevant air-contaminant data. [Company name] will use only National Institute for Occupational Safety and Health- (NIOSH-) certified respirators. The program administrator will select respirators based on the criteria in Table I.

Table 1
Respirator Selection Criteria

Particulate Exposure	*-Respirators will be selected on the basis of potential oil mist exposure (N, P or R), severity of the inhalation hazard (95 percent, 99 percent or 100 percent efficient), air-particulate concentration and the availability of at least 20.9 percent oxygen.*
Vapor and Gas Exposure	*-Respirators will be selected on the basis of chemical composition, physical state (vapor or gas), air-contaminant concentration and availability of at least 20.9 percent oxygen.*
Atmospheric oxygen at or below 19.5 percent or contaminants that are immediately dangerous to life and health. (These are rarely needed in the roofing industry.)	*Supplied-air respirators will be selected. Only Grade D breathing air will be used. Respirators will be selected based -on the potential for a specific type of hazardous gas leak, relevant engineering controls, and the time required for workers to escape to a safe place.*
-Escape-only respirators (These are rarely needed in the roofing industry.)	*Only NIOSH-approved escape respirators will be used.*

When determining assigned protection factors (APFs), the program administrator will rely on the NIOSH Pocket Guide to Chemical Hazards until the Occupational Safety and Health Administration (OSHA) issues its final ruling covering APFs.

Medical Evaluations

Each employee required to wear a respirator or who requests an air-purifying respirator must be medically evaluated before being fit tested. The program administrator will make arrangements for each employee to have a medical evaluation by a professionally licensed health care provider (PLHCP).

The program administrator will provide a copy of the OSHA Respirator Medical Evaluation Questionnaire (1910.134, Appendix C) to each employee who must wear respirators. The program administrator will collect completed questionnaires and give them to the PLHCP.

The program administrator also will provide the PLHCP with the following information:

- *Type and weight of respirator each employee will use*
- *Duration and frequency of use*
- *Expected physical work effort*
- *Any other protective equipment and clothing needed*
- *Temperature and humidity extremes at the job site*
- *Air contaminants and concentration levels that each employee may encounter*

The PLHCP will discuss results of the evaluation with the employee and provide a written determination to the program administrator. The determination will not contain confidential medical information but will include:

- *The PLHCP's opinion of the employee's ability to tolerate a respirator*
- *Any limitations of respirator use*
- *Any need for follow-up evaluations*
- *A statement that the employee has been informed of the determination*

If the PLHCP recommends alternative respiratory protection, such as a powered-air purifying respirator, the program administrator will comply with the recommendation.

The program administrator will maintain a file of the PLHCP's written determination for each employee.

Employees will receive follow-up medical evaluations under the following conditions:

- *The employee reports medical signs or symptoms related to the use of the respirator.*
- *The PLHCP, a supervisor or the program administrator recommends a re-evaluation.*
- *Fit-test or other program information indicates a need for re-evaluation*
- *Changes in the workplace increase respiratory stress*

Fit Testing

All employees using a tight-fitting face-piece respirator must pass an appropriate qualitative fit test (QLFT) or quantitative fit test (QNFT). The program administrator will determine which test is appropriate for each type of respirator. Qualitative and quantitative fit tests will be administered with appropriate protocol from 29 CFR 1910.134, Appendix A. A QLFT will be used only to fit test negative pressure air-purifying respirators that achieve a fit factor of 100 or less.

Employees must be fit tested before they use a respirator for the first time; whenever they use a different respirator face piece; and after any changes in the physical condition that could affect respirator fit.

Fit tests will be administered using employees' assigned respirators (from previous fit-testing results) or from a selection of respirators set up for fit-testing purposes (for an initial fit test).

All employees must be fit tested annually.

Respirator Use

Using Tight-fitting Respirators

Employees who have beards or other conditions that interfere with the face-to-face seal or valve function cannot wear tight-fitting respirator face pieces. Clean-shaven skin must be in contact with all respirator sealing surfaces. PPE or clothing that interferes with the face-to-face seal or valve function is not permitted.

Corrective lenses with temple bars or straps that interfere with face-to-face sealing area cannot be used with any respirator.

Each employee must perform a user seal check before putting on a tight-fitting respirator. The procedures can be found in 29 CFR 1910.134, Appendix B-1.

Monitoring Respirator Effectiveness

The program administrator will monitor and re-evaluate the effectiveness of employees' respirators after any significant changes in workplace conditions or exposure levels. Employees are to leave the areas in which they wear respirators when they need to wash faces and their respirator face pieces; detect face piece leaks or change in breathing resistance; or must change respirators, filters, cartridges or canister elements.

Using respirators in immediately dangerous to life and health (IDLH) atmospheres

IDLH atmospheres are rarely encountered in the roofing industry; however, should any employee need to enter an IDLH atmosphere, the following procedures will be implemented:

- *At least one employee must stay immediately outside the IDLH atmosphere to respond to emergencies.*
- *The person entering the IDLH atmosphere and the person outside the IDLH atmosphere must maintain visual and voice or signal contact.*
- *The person outside the IDLH atmosphere must be trained and equipped to provide effective emergency response.*
- *The person outside the IDLH atmosphere must be equipped with a positive-pressure SCBA or positive-pressure supplied-air respirator with auxiliary SCBA and appropriate rescue retrieval equipment.*
- *The program administrator or other designated person must be notified before an emergency responder enters the IDLH environment.*

Respirator maintenance and care

Before any new respirator is used, it must be washed, disinfected and inspected according to the manufacturer's instructions or the instructions in 29 CFR 1910.134, Appendix B-2. Employees must clean and disinfect their own respirators after each use and store them in a sanitary location so the face pieces and valves are protected.

Respirators used for fit testing must be cleaned and disinfected after each use by the person conducting the fit test.

Employees must inspect their respirators before they use them and after they clean them. Inspection includes a check of respirator function; tightness of connections; and the condition of the elastomeric face piece, head straps, valves, connecting tubes, cartridges, canisters and filters.

Only trained employees can replace worn or deteriorated respirator parts. All repair work, adjustments and replaced parts must comply with the respirator manufacturer's instructions.

Tables 2 and 3 show the required intervals for cleaning, disinfecting and inspecting respirators.

Table 2 - Respirator Cleaning and Disinfecting Intervals

Respirators issued for the exclusive use of an employee	*-Clean and disinfect as often as necessary to be maintained in a sanitary condition.*
Respirators issued to more than one employee	*Clean and disinfect after being worn by each user.*
Respirators maintained for emergency use	*Clean and disinfect after each use.*
Respirators used in fit testing and training	*Clean and disinfect after each use.*

Table 3 - Respirator Inspection Intervals

Respirators used in routine situations	*Inspect before each use and during cleaning.*
Respirators used in emergency situations	*-Inspect at least monthly, in accordance with manufacturers' recommendations; check for proper function before and after each use.*
Respirators used for emergency-escape-only situations	*Inspect just before use.*

Identity of Filters, Cartridges and Canisters

All filters, cartridges and canisters must be maintained as received by the manufacturers, distributors or suppliers and labeled and color-coded with the NIOSH-approval label. The label cannot be removed and must remain legible. Defective filters, canisters and cartridges cannot be used and must be removed from service.

Air Quality in Atmosphere-supplying Respirators

Compressed breathing air used in atmosphere-supplying respirators must meet the criteria established by the American National Standards Institute (ANSI) for grade D breathing air.

Training

Before any employee wears a respirator for the first time, he must receive training on and demonstrate comprehension of:

- *Why a respirator is necessary*
- *How improper fit, use or maintenance can compromise the protective effect of a respirator*
- *A respirator's capabilities and limitations*
- *How to use a respirator in emergency situations, including ones in which the respirator malfunctions*
- *How to inspect, put on and remove a respirator and check the seals*
- *Proper maintenance and storage procedures*
- *How to recognize medical signs and symptoms that may limit or prevent effective respirator use*

Training will be provided by our program administrator or other qualified person. The training will be fully documented, certifying that employees understand the concepts presented and have demonstrated how to use and wear the respirator.

The training must give each user an opportunity to handle the respirator; have it fitted properly; test its face-to-face seal; wear it in normal air for a trial period; and wear it in a test atmosphere.

Retraining must be performed annually or as deemed necessary by the program administrator.

Employees who are responsible for inspecting the emergency and supplied-air respirators will receive supplied-air respirator-specific training.

Employees who are permitted to wear respirators must first read the information in 29 CFR 1910.134, Appendix D.

Program Evaluation

The program administrator will evaluate this program annually or more often if necessary to ensure it remains effective. The administrator will consult employees about proper respirator fit, selection, use and maintenance and make periodic workplace observations to confirm that respirators are being used and maintained properly.

Record Keeping

The program administrator will maintain records of nonconfidential medical evaluation determinations, fit testing, training documentation and annual inspection audits and make them available to employees.

OSHA Respiratory Medical Evaluation Questionnaire

To the employer: Answers to questions in Section 1 and to question 9 in Section 2 of Part A do not require a medical examination.

To the employee:

Can you read: Yes No

Your employer must allow you to answer this questionnaire during normal working hours or at a time and place that is convenient for you. To maintain your confidentiality, your employer or supervisor will not look at or review your answers and your employer must tell you how to deliver or send this questionnaire to a health care professional, who will review it.

Part A. Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

1. *Today's date: _____*
2. *Your name: _____*
3. *Your age (to nearest year): _____*
4. *Sex: Male Female*
5. *Your height: _____ feet _____ inches*
6. *Your weight: _____ pounds*
7. *Your job title: _____*
8. *A phone number where you can be reached by the health-care professional who reviews this questionnaire (include the area code): _____*
9. *The best time to phone you at this number: _____*
10. *Has your employer told you how to contact the health care professional who will review this questionnaire? ___Yes ___No*
11. *Check the type of respirator you will use (you can check more than one category):*

a. ____ N, R or P disposable respirator (filter-mask, noncartridge type only)

b. ____ Other type (for example, half- or full-face piece type, powered-air purifying, supplied-air, self-contained breathing apparatus)

12. *Have you worn a respirator? ___ Yes ___No*

If "yes," what type(s)?: _____

_____

Part A. Section 2. (Mandatory) Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator. (Please circle yes or no.)

1. Do you currently smoke tobacco, or have you smoked tobacco in the last month?		*Yes*	*No*
2. Have you ever had any of the following conditions?			
a.	*Seizures (fits)*	*Yes*	*No*
b.	*Diabetes (sugar disease)*	*Yes*	*No*
c.	*Allergic reactions that interfere with your breathing*	*Yes*	*No*
d.	*Claustrophobia (fear of closed-in places)*	*Yes*	*No*
e.	*Trouble smelling odors*	*Yes*	*No*
3. Have you ever had any of the following pulmonary or lung problems?			
a.	*Asbestosis*	*Yes*	*No*
b.	*Asthma*	*Yes*	*No*
c.	*Chronic bronchitis*	*Yes*	*No*
d.	*Emphysema*	*Yes*	*No*
e.	*Pneumonia*	*Yes*	*No*
f.	*Tuberculosis*	*Yes*	*No*
g.	*Silicosis*	*Yes*	*No*
h.	*Pneumothorax (collapsed lung)*	*Yes*	*No*
i.	*Lung cancer*	*Yes*	*No*
j.	*Broken ribs*	*Yes*	*No*
k.	*Any chest injuries or surgeries*	*Yes*	*No*
l.	*Any other lung problem that you've been told about*	*Yes*	*No*
4. Do you currently have any of the following symptoms of pulmonary or lung illness?			
a.	*Shortness of breath*	*Yes*	*No*
b.	*Shortness of breath when walking fast on level ground or walking up a slight hill or incline*	*Yes*	*No*
c.	*Shortness of breath when walking with other people at an ordinary pace on level ground*	*Yes*	*No*
d.	*Have to stop for breath when walking at your own pace on level ground*	*Yes*	*No*
e.	*Shortness of breath when washing or dressing yourself*	*Yes*	*No*
f.	*Shortness of breath that interferes with your job*	*Yes*	*No*
g.	*Coughing that produces phlegm (thick sputum)*	*Yes*	*No*
h.	*Coughing that wakes you early in the morning*	*Yes*	*No*
i.	*Coughing that occurs mostly when you are lying down*	*Yes*	*No*
j.	*Coughing up blood in the last month*	*Yes*	*No*
k.	*Wheezing*	*Yes*	*No*
l.	*Wheezing that interferes with your job*	*Yes*	*No*
m.	*Chest pain when you breathe deeply*	*Yes*	*No*
n.	*Any other symptoms that you think may be related to lung problems*	*Yes*	*No*
5. Have you ever had any of the following cardiovascular or heart problems?			
a.	*Heart attack*	*Yes*	*No*
b.	*Stroke*	*Yes*	*No*
c.	*Angina*	*Yes*	*No*
d.	*Heart failure*	*Yes*	*No*
e.	*Swelling in your legs or feet (not caused by walking)*	*Yes*	*No*
f.	*Heart arrhythmia (irregular heart beat)*	*Yes*	*No*
g.	*High blood pressure*	*Yes*	*No*
h.	*Any other heart problem that you've been told about*	*Yes*	*No*

6. Have you ever had any of the following cardiovascular or heart symptoms?

a.	*Frequent pain or tightness in your chest*	*Yes*	*No*
b.	*Pain or tightness in your chest during physical activity*	*Yes*	*No*
c.	*Pain or tightness in your chest that interferes with your job*	*Yes*	*No*
d.	*In the past two years, have you noticed your heart skipping or missing a beat?*	*Yes*	*No*
e.	*Heartburn or indigestion that is not related to eating*	*Yes*	*No*
f.	*Any other symptoms that you think may be related to heart or circulation problems*	*Yes*	*No*

7. Do you currently take medication for any of the following problems?

a.	*Breathing or lung problems*	*Yes*	*No*
b.	*Heart trouble*	*Yes*	*No*
c.	*Blood pressure*	*Yes*	*No*
d.	*Seizures (fits)*	*Yes*	*No*

8. If you've used a respirator, have you ever had any of the following problems?

(If you've never used a respirator, check the following space and go to question 9. _____.)

a.	*Eye irritation*	*Yes*	*No*
b.	*Skin allergies or rashes*	*Yes*	*No*
c.	*Anxiety*	*Yes*	*No*
d.	*General weakness or fatigue*	*Yes*	*No*
e.	*Any other problem that interferes with your use of a respirator*	*Yes*	*No*

9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire? *Yes* *No*

Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-face piece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.

10. Have you ever lost vision in either eye (temporarily or permanently)? *Yes* *No*

11. Do you currently have any of the following vision problems?

a.	*Wear contact lenses*	*Yes*	*No*
b.	*Wear glasses*		
c.	*Color blind*	*Yes*	*No*
d.	*Any other eye or vision problem*	*Yes*	*No*

12. Have you ever had an injury to your ears, including a broken ear drum? *Yes* *No*

13. Do you currently have any of the following hearing problems?

a.	*Difficulty hearing*	*Yes*	*No*
b.	*Wear a hearing aid*	*Yes*	*No*
c.	*Any other hearing or ear problem*	*Yes*	*No*

14. Have you ever had a back injury? *Yes* *No*

15. Do you currently have any of the following musculoskeletal problems?

a.	*Weakness in any of your arms, hands, legs or feet*	*Yes*	*No*

b.	*Back pain*		
c.	*Difficulty fully moving your arms and legs*	*Yes*	*No*
d.	*Pain or stiffness when you lean forward or backward at the waist*	*Yes*	*No*
e.	*Difficulty fully moving your head up or down*	*Yes*	*No*
f.	*Difficulty fully moving your head side to side*	*Yes*	*No*
g.	*Difficulty bending at your knees*	*Yes*	*No*
h.	*Difficulty squatting to the ground*	*Yes*	*No*
i.	*Difficulty climbing stairs or a ladder carrying more than 25 pounds*	*Yes*	*No*
j.	*Any other muscle or skeletal problem that interferes with using a respirator*	*Yes*	*No*

Employee Name: _____

Signature: _____

Date: _____

Part B. Any of the following questions and other questions may be added to the questionnaire at the discretion of the health care professional who will review the questionnaire.

1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower-than-normal amounts of oxygen? Yes No

If "yes," do you have feelings of dizziness, shortness of breath, pounding in your chest or other symptoms when you're working under these conditions? Yes No

2. At work or home, have you ever been exposed to hazardous solvents or hazardous airborne chemicals (e.g., gases, fumes or dust) or come into skin contact with hazardous chemicals? Yes No

If "yes," name the chemicals if you know them: _____

_____

_____

_____

3. Have you ever worked with any of the materials or under any of the conditions listed below?

a.	*Asbestos*	*Yes*	*No*
b.	*Silica (e.g., in sandblasting)*	*Yes*	*No*
c.	*Tungsten/cobalt (e.g., grinding or welding this material):*	*Yes*	*No*
d.	*Beryllium*	*Yes*	*No*
e.	*Aluminum*	*Yes*	*No*
f.	*Coal (e.g., mining)*	*Yes*	*No*
g.	*Iron*	*Yes*	*No*
h.	*Tin*	*Yes*	*No*
i.	*Dusty environments*	*Yes*	*No*
j.	*Any other hazardous exposures*	*Yes*	*No*

If "yes," describe these incidents of exposures: _____

_____

_____

_____

4. List any second jobs or side businesses you have: _____

_____

5. List your previous occupations: _____

_____

*6. List your current and previous hobbies:*_____

_____

7. Have you been in the military services? *Yes* *No*
If "yes," were you exposed to biological or chemical agents (either in training or combat)? *Yes* *No*

8. Have you ever worked on a hazardous material team? *Yes* *No*

9. Other than medications for breathing and lung problems, heart trouble, blood pressure and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications)?
Yes No

If "yes," name the medications if you know them: _____

_____

_____

10. Will you be using any of the following items with your respirator(s)?

a. High-efficiency purifying air filters *Yes* *No*
b. Canisters (e.g., gas masks) *Yes* *No*
c. Cartridges *Yes* *No*

11. How often are you expected to use the respirator(s)? Circle "yes" or "no" for all answers that apply to you.

a. Escape only (no rescue) *Yes* *No*
b. Emergency rescue only *Yes* *No*
c. Less than five hours per week *Yes* *No*
d. Less than two hours per day *Yes* *No*
e. Two to four hours per day *Yes* *No*
f. More than four hours per day *Yes* *No*

12. -During the period you are using the respirator(s), is your work effort:

a. Light (less than 200 kcal per hour)? *Yes* *No*
If "yes," how long does this period last during the average shift? _____ hours _____ minutes.
Examples of a light work effort are sitting while writing, typing, drafting or performing light assembly work and standing while operating a drill press (1to 3 pounds) or controlling machines.

b. Moderate (200 to 350 kcal per hour): *Yes* *No*

If "yes," how long does this period last during the average shift? _____ hours _____ minutes.

Examples of moderate work effort are sitting while nailing or filing; driving a truck or bus in urban traffic; standing while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 pounds) at trunk level; walking on a level surface about 2 mph or down a 5-degree grade about 3 mph; and pushing a wheelbarrow with a heavy load (about 100 pounds) on a level surface.

c. Heavy (above 350 kcal per hour): *Yes* *No*

If "yes," how long does this period last during the average shift? _____ hours _____ minutes.

Examples of heavy work are lifting a heavy load (about 50 pounds) from the floor to your waist or shoulder; working on a loading dock; shoveling; standing while bricklaying or chipping castings; walking up an 8-degree grade about 2 mph; and climbing stairs with a heavy load (about 50 pounds).

13. Will you be wearing protective clothing and/or equipment (other than the respirator) when you're using your respirator? Yes No

If "yes," describe this protective clothing and/or equipment: _____

_____

_____

14. Will you be working under hot conditions (temperature exceeding 77 F)? *Yes* *No*

15. Will you be working under humid conditions? *Yes* *No*

16. Describe the work you'll be doing while you're using your respirator(s): _____

_____

_____

_____

17. Describe any special or hazardous conditions you might encounter when you're using your respirator(s) (e.g., confined spaces, life-threatening gases): _____

_____

_____

_____

18. Provide the following information, if you know it, for each toxic substance you'll be exposed to when you're using your respirator(s):

Name of the first toxic substance: _____

Estimated maximum exposure level per shift: _____

Duration of exposure per shift: _____

Name of the second toxic substance: _____

Estimated maximum exposure level per shift: _____

Duration of exposure per shift: _____

Name of the third toxic substance: _____

Estimated maximum exposure level per shift: _____

Duration of exposure per shift: _____

The name of any other toxic substances you will be exposed to while using your respirator: _____

_____

_____

_____

19. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of others (e.g., rescue, security): _____

_____

_____

_____

_____

Employee Name: _____

Signature: _____

Date: _____

Supplemental Information to the PLHCP

Before a recommendation can by made by the professionally licensed health care provider (PLHCP), OSHA requires the following information be included so it, too, can be taken under consideration:

1. The type and weight of the respirator
2. The duration and frequency of respirator use
3. The expected physical work effort
4. Any additional PPE or clothing to be worn
5. Temperature and humidity extremes that may be encountered
6. A copy of [company name's] written program and a copy of OSHA's standard, 29 CFR 1910.134

Employee Name: _____

Job Title: _____

Type of respirator:

Half mask	_____
Full-face piece	_____
Dust mask	_____
Powered air-purifying respirator	_____

Duration/Frequency of use:

Duration	_____	*Hours*
Frequency	_____	*Daily*
	_____	*Number of times per week*
	_____	*Number of times per month*

Expected workload:

Light	_____
Medium	_____
Heavy	_____

Indicate any other PPE required at same time of respirator use: _____

_____

Temperature and humidity extremes:

Low temperature:	_____
High temperature:	_____
High humidity:	_____

Appendix D to 29 CFR 1910.134.

Information for Employees Using Respirators When Not Required Under the Standard

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer

provides respirators for your voluntary use or if you provide your own respirator, you need to take certain precautions to be sure the respirator itself does not present a hazard.

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirator's limitations.

2. Choose respirators certified for use to protect against the contaminant of concern. The National Institute for Occupational Safety and Health (NIOSH) of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.

3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.

4. Keep track of your respirator so you do not mistakenly use someone else's.