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Breathe Easy:
Respiratory Protection Requirements Simplified

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When occupational dusts, fumes, mists, gases, vapors, biological agents and infectious pathogens are present hazards to employees, employers must implement a respiratory protection program. OSHA's Respiratory Protection Standard, 29CFR 1910.134, outlines these employer requirements. Many employers continue to struggle with this standard. In fact, during the fiscal year 2009, OSHA issued 3803 citations related to respiratory protection, the fourth most cited standard. Industry classifications with the highest number of citations included: masonry/stone cutters, paint shops, auto repair, millwork, fabricated metal shops and ship/boat repair.[1]

How do you ensure compliance with this standard and, more importantly, protect the safety of your employees? It is not very complicated; however, building an effective program can take a moderate amount of expertise and a significant amount of time. Additionally, once the program is in place, it is important keep the program on your radar. Program enforcement and monitoring program effectiveness are the keys to maintaining compliance.

The following paper outlines the critical components of a compliant program.

Program Administrator

OSHA requires employers to name a suitably trained program administrator. The program administrator is responsible for establishing and maintaining a written respiratory protection program. The program administrator is also responsible for evaluating those tasks for which respiratory protection is thought to be necessary, determining the degree of hazard posed by the potential exposure, determining whether engineering or administrative controls are feasible, and specifying which respiratory protection device is to be used for each task. In addition, the program administrator will ensure that personnel are trained in the use of respiratory protective devices, are fit tested, and are issued the necessary protective devices.

Written Program

A written program must be designed and organized to ensure that respirators are properly selected, used, and maintained to meet OSHA regulatory standards and industry-accepted standards (i.e., ANSI). The program must contain worksite-specific procedures and should be updated any time work practices or conditions change the way respirators are used. As applicable, each of the following items must be included in the written program:

1. Procedures for selecting respirators for use in the workplace;
2. Medical evaluations of employees who use respirators;
3. Fit testing procedures for tight-fitting respirators;

4. Procedures for proper use of respirators in routine and reasonably foreseeable emergency; situations

5. Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators;

6. Procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators;

7. Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations;

8. Training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance; and

9. Procedures for regularly evaluating the effectiveness of the program.

Hazard Assessment

The basis for any effective program is a hazard assessment to determine the potential need for respiratory protection. The program administrator, or his designee, must perform an assessment to first identify airborne contaminants and then determine if these contaminants present a hazard to employees. This assessment shall include a reasonable estimate of employee exposures to respiratory hazard(s) and an identification of the contaminant's chemical state and physical form. Respiratory hazards generally fall into one of the following categories:

1. **Particulates (Dusts):** Asbestos, abrasive blasting, sanding, grinding

2. **Particulates (Mists):** TB droplet nuclei, spraying processes (paints, pesticides)

3. **Particulates (Fumes):** Welding operations (copper, lead)

4. **Particulates (Smoke):** Firefighting, surgery

5. **Vapors:** Xylene, solvents, paints, acetone, mercury, formaldehyde

6. **Gases:** Carbon dioxide, nitrogen, nitrous oxide, ethylene oxide

7. **Oxygen Deficient (<19.5%):** Confined space

Once a hazard has been identified, the program administrator must determine the extent of the hazard and if it can be abated through the hierarchy of controls in order to avoid the need for respirators. When hazards exist, engineering controls are the preferred method of abating or reducing the hazard to safe levels. If engineering controls are not feasible, administrative controls should be employed. In cases where engineering and administrative controls are not able to reduce the hazard to safe levels, respiratory protection will be required. Skipping this step is a common OSHA citation.

Selection of Respirators

The employer shall provide respirators, training, and medical evaluations at no cost to the employee. Only NIOSH-approved respirators should be selected by the program administrator, using ANSI Z88.2, *NIOSH Certified Equipment List*[2], and/or the *NIOSH Respirator Selection Decision Logic*[3] as a guide.

All filters, cartridges and canisters must be labeled and color-coded with NIOSH/MSHA-approved labels. Respirators must be appropriate for the task and correctly fit the user.

The following items will be considered in the selection of respirators:

1. Effectiveness of the device against the substance of concern;
2. Estimated maximum concentration of the substance in the work area;
3. General environment (open area or confined space, etc.);
4. Known limitations of the respiratory protective device;
5. Comfort, fit, and worker acceptance; and
6. Other contaminants in the environment or potential for oxygen deficiency.

Immediately Dangerous to Life and Health (IDLH) Atmospheres

When the hazard assessment indicates that conditions may present an IDLH situation, employers must comply with additional requirements. IDLH atmospheres include:

1. Atmospheres that pose a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate or delayed permanent adverse health effects.
2. Atmospheres with less than 19.5% oxygen.
3. Atmospheres from which escape may not be possible without the aid of respiratory equipment.
4. Atmospheres with unknown contaminants or concentrations that may present a hazardous environment.

Only those employees who have had specific training to enter IDLH atmospheres shall be allowed to do so. Employees entering an IDLH atmosphere shall wear either a positive pressure SCBA or airline-supplied air respirator with an escape SCBA and appropriate retrieval equipment. Air purifying respirators are prohibited. Visual, voice, or signal line communication will be maintained between the employee(s) in the IDLH atmosphere and employee(s) outside of the IDLH atmosphere. A rescue plan shall be developed before the employee(s) enter the IDLH atmosphere and appropriately trained and equipped rescue personnel shall be prepared to execute the plan if needed.

Voluntary Use

Respiratory protection will generally not be required and utilized unless the need to do so is determined by a risk assessment. Employee requests for voluntary use of a respirator may be considered on a case-by-case basis, provided that the respirator itself does not create a hazard.

Employees using respirators on a voluntary basis are required to read, "Information for Employees Using Respirators When Not Required Under the Standard" (Appendix D of 29CFR 1910.134).[4]

The employer must ensure that all elements of a respiratory protection program are applied to any employee who is using a respirator voluntarily, including the fact that the employee is medically qualified to use that respirator, and that the respirator is cleaned, stored, and maintained so that its use does not present a health hazard to the user. The exception is that employers are not required to include in a written respiratory protection program when employees only use of respirators involves the voluntary use of filtering facepieces (dust masks).

Medical Surveillance Program

The employer must provide a medical evaluation to determine the employee's ability to safely use a respirator before the employee is fit tested or required to use the respirator in the workplace. Employees who will attend training for using respiratory protection also must first be cleared to do so through a medical evaluation process. To ensure the examining physician or other licensed healthcare professional (PLHCP)[5] can render a qualified opinion regarding the employee's use of respiratory protection, the program administrator must provide him/her the following information:

1. Type of respirator to be used,
2. Task that will be performed,
3. Period of time respirator will be worn,
4. The hazardous substances involved, and
5. Verbal communications required in the task.

OSHA has made the medical evaluation process straightforward by developing a medical/occupational history questionnaire (Appendix C of 29CFR 1910.134).[6] This questionnaire is to be reviewed by the PLHCP and a follow-up examination conducted when:

1. An employee gives a positive response to any question listed under Part A, sections 1-8, or whose questionnaire demonstrates the need for additional medical exams and tests as determined by the PLHCP;
2. An employee reports medical signs or symptoms that are related to their ability to use a respirator;
3. A PLHCP, supervisor, or the respirator program administrator informs the employer that an employee needs to be reevaluated;
4. Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicate a need for employee reevaluation; or
5. A change occurs in workplace conditions (e.g., physical work effort, protective clothing, and temperature) that may result in a substantial increase in the physiological burden placed on an employee.

Fit Testing and Fit Checking

A fit test will be used to determine the ability of each individual respirator wearer to obtain a satisfactory fit with any air-purifying respirator. Either quantitative[7] or qualitative[8] fit tests can be performed. Employees must successfully pass the fit test before being issued a face piece seal, air-purifying respirator. Note: Loose-fitting, hood-powered air purifying respirators (PAPRs) do not require fit testing.

No employee should be permitted to wear a negative-pressure respirator in a work situation until he or she has demonstrated that an acceptable fit can be obtained. Respirator fitting is conducted initially upon assignment to a task requiring use of a respirator. Refitting is conducted annually thereafter upon successful completion of respirator training.

Fit testing will be coordinated by the program administrator, and the test results will be the determining factor in selecting the type, model, and size of negative-pressure respirator for use by each individual respirator wearer. Fit testing will be conducted per the protocols outlined in "Appendix A: Fit Testing Procedures"[9].

Each time a respirator is donned, the user must perform positive and negative pressure fit checks. These checks are not a substitute for fit testing. Respirator users must be properly trained in the performance of these checks and understand their limitations.

Cartridge Change-Out Schedule

If the respirator is equipped with a NIOSH-certified End-of-Service-Life Indicator (ESLI), it may be used to determine when to change out air-purifying elements (cartridges). If no ESLI is available for the selected air-purifying elements, then the program administrator must use objective information and data to determine a change-out schedule to ensure that the air-purifying elements are changed out before the end of their useful service life. OSHA's Advisor Genius[10] can also be used to determine a change-out schedule. A change-out log should also be developed by the program dministrator and given to the respirator wearer.

The following factors may be utilized to estimate ESLI:

1. The relative humidity of the work area. Humidity above 85% can reduce an air-purifying element's estimated service life by approximately 50%.
2. The type of air contaminant.
3. The concentration of the air contaminant. By reducing the amount of contaminant by a factor of ten (10), the service life of an air-purifying element can be increased by a factor of five (5).
4. The breathing demand of the respirator wearer. The harder and faster one breathes due to work stresses, the shorter the air-purifying element's service life.
5. The presence of multiple contaminants.
6. How variable the contaminant's concentration(s) will be.
7. The breakthrough time(s) of the contaminant(s).

Each time the respirator is used, the wearer should record on the log the amount of time worn and keep track of the cartridge’s cumulative time. The respirator wearer shall change-out and discard any air-purifying elements that have reached their ESLI, failed during use, become damaged or wet, or become difficult to breathe through.

Breathing Air Quality and Use

Compressed breathing air must meet or exceed the requirements for Grade D breathing air, described in *ANSI/Compressed Gas Association Commodity Specification for Air*, G-7.1-1989, to include:

1. Oxygen content of 19.5-23.5%,
2. Hydrocarbon (condensed) content of no more than 5 milligrams per cubic meter of air,
3. Carbon monoxide (CO) content of no more than 10 ppm,
4. Carbon dioxide content of no more than 1,000 ppm, and
5. Lack of noticeable odor.

Compressors used to supply breathing air to respirators are constructed and situated so as to:

1. Prevent entry of contaminated air into the air-supply system.
2. Minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F below the ambient temperature.

3. Have suitable in-line air-purifying sorbent beds and filters to further ensure the quality of breathing air. Sorbent beds and filters must be maintained and replaced or refurbished periodically following the manufacturer's instructions.
4. Have a tag containing the most recent change date and the signature of the person authorized by the employer to perform the change. The tag must be maintained at the compressor.
5. For compressors that are not oil-lubricated, carbon monoxide levels in the breathing air must not exceed 10 ppm.
6. For oil-lubricated compressors, a high-temperature alarm or carbon monoxide alarm, or both, are used to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply must be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm:
    - Breathing air couplings must be incompatible with outlets for non-respirable worksite air or other gas systems. No asphyxiating substance can be introduced into breathing-air lines.
    - Breathing gas containers must be marked in accordance with the NIOSH respirator certification standard, 42 CFR part 84.

Inspection, Cleaning, and Storage

All respirators used under permanent or temporary assignment will be inspected prior to each donning by the assigned employee. The employee is responsible for a check of respirator function, tightness of connections, and the condition of the various parts. Respirators used for emergency response must be inspected at least monthly by the program administrator.

Those respirators assigned to an employee for his or her exclusive use shall be cleaned and disinfected as needed, but no less than weekly. Those respirators assigned on an emergency or temporary basis shall be cleaned and disinfected after each use and prior to each reassignment to another employee.

All respirators shall be stored in a clean, dry, and contaminant-free environment. Efforts should be made to avoid storing respirators in areas that may experience extreme environmental conditions such as high heat, cold or direct sunlight. The respirator/face piece shall be placed in a plastic bag to ensure that a contaminant does not get into or onto the face piece of the respirator. They shall be packed in such a way to prevent the deformation of the face seal and exhalation valve. Whenever possible, respiratory protection should be stored in a secured area. Respirators used for emergency response shall be stored in an easily accessible area and shall be clearly identified. Any additional manufacturer’s storage requirements will also be followed.

Training and Education

Prior to the assignment of a respiratory protection device, employees will receive training, which includes the following:

1. Explanation of the employer’s respirator policy.
2. The responsibilities of the program administrator.
3. The employee's responsibility.
4. Explanation of the respiratory hazards posed by the operations and regulated areas.
5. Explanation of current administrative and engineering controls used in conjunction with respiratory protection.

6. Explanation of the selection process.
7. The functions, capabilities, and limitations of the selected respirator.
8. Demonstrations on donning, fit testing, and proper wearing of the respirator.
9. Respiratory maintenance, cleaning, and storage.
10. The federal and state government's regulatory requirements.
11. Emergency situations.
12. Each employee must be able to demonstrate knowledge of at least the following:
    - Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.
    - What the limitations and capabilities of the respirator are.
    - How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.
    - How to inspect, put on and remove, use, and check the seals of the respirator.
    - How to maintain and store the respirator.
    - When and how the filter media is to be changed, including how to effectively use the change out schedule.
    - How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
    - As part of the training, how to handle the selected respirator, have it fitted properly, test the face piece and face seal, and wear it in "normal" air.

Retraining must be administered annually, or when the following situations occur:

1. Changes in the workplace or the type of respirator render previous training obsolete;
2. Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill; or
3. Any other situation that arises in which retraining appears necessary to ensure safe respirator use.

Program Evaluation

On an annual basis, the program administrator shall review all points of the program with the affected personnel to ensure effectiveness and workability. Furthermore, all program points shall be reviewed in comparison to current OSHA regulations and CDC guidelines to ensure proper compliance.

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[1] OSHA, "Most Frequently Cited Standards," (http://www.osha.gov/dcsp/compliance_assistance/frequent_standards.html), retrieved March 2010.

[2] NIOSH, "Certified Equipment List," (http://www.cdc.gov/niosh/npptl/topics/respirators/CEL/), retrieved March 2010.

[3] NIOSH, "Respirator Decision Logic," (http://www.cdc.gov/niosh/docs/87-108/), retrieved March 2010.

[4] OSHA, "Information for Employees Using Respirators When not Required Under Standard," (http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9784), retrieved March 2010.

[5] "Physician or other licensed health care professional" means an individual whose legally permitted scope or practice (i.e., license, registration, or certification) allows him or her to independently provide, or be delegated the responsibility to provide, some or all of the health care services required by subsection (e).

[6] OSHA, "OSHA Respirator Medical Evaluation Questionnaire," (http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9783), retrieved March 2010.

[7] Qualitative fit test (QLFT) means a pass/fail fit test to assess the adequacy of respirator fit test that relies on the individual's response to the test agent.

[8] Quantitative fit test (QNFT) means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

[9] OSHA, "Fit Testing Procedures," (http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9780), retrieved March 2010.

[10] OSHA, "OSHA's Advisor Genius," (http://www.osha.gov/SLTC/etools/respiratory/advisor_genius_wood/advisor_genius.html), retrieved March 2010.