



**PDHonline Course C523 (6 PDH)**

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**OSHA Required Training – Respiratory  
Protection – 29 CFR 1910.134**

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**2020**

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## **OSHA Required Training**

## **Respirator Protection**

**29 CFR 1910.134**

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RESPIRATORY PROTECTION  
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OSHA DOCUMENT #: 9071**

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# **OSHA REQUIRED TRAINING CONTROL OF HAZARDOUS ENERGY – EXECUTIVE SUMMARY –**

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## **1.0 OSHA Overview**

The Occupational Safety and Health Administration (OSHA) was created by the United States Congress in 1971 as a federal agency in the Department of Labor. OSHA's mission is to assure the safety and health of America's workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health. Since its inception, OSHA has helped to cut workplace fatalities by more than 60 percent and occupational injury and illness rates by 40 percent. At the same time, U.S. employment has doubled from 56 million workers at 3.5 million worksites to more than 115 million workers at 7.2 million sites.

## **2.0 Introduction to Respiratory Protection**

An estimated 5 million workers are required to wear respirators in 1.3 million workplaces throughout the United States. Respirators protect workers against insufficient oxygen environments, harmful dusts, fogs, smokes, mists, gases, vapors, and sprays. These hazards may cause cancer, lung impairment, other diseases, or death. Compliance with the OSHA Respiratory Protection Standard could avert hundreds of deaths and thousands of illnesses annually.

## **3.0 Regulatory Standards**

Respiratory Protection is addressed in OSHA standards specifically for general industry, shipyard employment, marine terminals, longshoring, and construction industries. An outline of these regulatory standards is provided as follows. This course material will focus primarily on the criteria with the widest application – General Industry (29 CFR 1910.134).

It should be noted, that twenty-five states, Puerto Rico and the Virgin Islands have OSHA-approved State Plans and have adopted their own standards and enforcement policies. For the most part, these States adopt standards that are identical to Federal OSHA. However, some States have adopted different standards applicable to this topic or may have different enforcement policies.



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**3.1 General Industry (29 CFR 1910)**

- 1910 Subpart I
  - 1910.134, Respiratory protection
    - Appendix A, Fit testing procedures (Mandatory)
    - Appendix B-1, User seal check procedures (Mandatory)
    - Appendix B-2, Respiratory cleaning procedures (Mandatory)
    - Appendix C, OSHA respirator medical evaluation questionnaire (Mandatory)
    - Spanish Language Translation of the OSHA medical evaluation questionnaire (Mandatory)
    - Appendix D, Information for employees using respirators when not required under standard (Mandatory)
    - Spanish Language Translation of the information for employees using respirators when not required under the standard. Also available in Questions and Answers on the Respiratory Protection Standard [337 KB PDF\*, 82 pages]. (1998, August 17). See Attachments 1 and 4.

The following standards include respiratory protection elements that may be affected by the revised standard 29 CFR 1910.134.

- 1910 Subpart L, Fire protection
  - 1910.156, Fire brigades [related topic page]
    - Appendix A, Fire protection
  - 1910 Subpart Z, Toxic and hazardous substances [related topic page]
    - 1910.1000, Air contaminants
    - 1910.1001, Asbestos [related topic page]
    - 1910.1017, Vinyl chloride
    - 1910.1018, Inorganic arsenic [related topic page]
    - 1910.1025, Lead [related topic page]
    - 1910.1026, Chromium (VI) [related topic page]
    - 1910.1027, Cadmium [related topic page]
    - 1910.1028, Benzene [related topic page]
    - 1910.1029, Coke oven emissions
    - 1910.1044, 1,2-dibromo-3-chloropropane
    - 1910.1045, Acrylonitrile
    - 1910.1047, Ethylene oxide [related topic page]
    - 1910.1048, Formaldehyde [related topic page]

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- 1910.1050, Methylenedianiline
- 1910.1051, 1,3-butadiene [related topic page]
- 1910.1052, Methylene chloride [related topic page]

**3.2 Shipyard Employment (29 CFR 1915)**

- 1915 Subpart I, Personal protective Equipment
  - 1915.154, Respiratory protection
- 1915 Subpart Z, Toxic and hazardous substances
  - 1915.1001, Asbestos
  - 1915.1026, Chromium (VI)

**3.3 Marine Terminals (29 CFR 1917)**

- 1917 Subpart E, Personal protection
  - 1917.92, Respiratory protection

**3.4 Longshoring (29 CFR 1918)**

- 1918 Subpart J, Personal protective equipment
  - 1918.102, Respiratory protection

**3.5 Construction (29 CFR 1926)**

- 1926 Subpart D, Occupational health and environmental controls
  - 1926.60, Methylenedianiline
  - 1926.62, Lead [related topic page]
- 1926 Subpart E, Personal protective and life saving equipment [related topic page]
  - 1926.103, Respiratory protection
- 1926 Subpart Z, Toxic and hazardous substances
  - 1926.1101, Asbestos
  - 1926.1127, Cadmium
  - 1926.1126, Chromium (VI)

**4.0 Overview of OSHA’s Respirator Protection Standard – 29 CFR 1910.134**

Provided below is an overview of OSHA’s Respiratory Protection Standard for General Industry – 29 CFR 1910.134.

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#### **4.1 Regulatory History Milestones**

- 1971 – OSHA adopted ANSI Respiratory Protection Standard
- 1994 – OSHA proposed revision of §1910.134 and initiated Tuberculosis (TB) rulemaking process
- 1998 – Revised Respiratory Protection Standard promulgated TB respirators under original §1910.134 (recodified as §1910.139) pending completion of TB rulemaking
- 2003 – OSHA withdraws proposed TB standard and applies revised standard for use of respirator for TB.
- 2006 – OSHA revised its existing Respiratory Protection Standard to add definitions and requirements for Assigned Protection Factors (APFs) and Maximum Use Concentrations (MUCs).

#### **4.2 Major Provisions of the Final Standard**

- Scope
  - The Respiratory Protection Standard applies to respirator use in all industries, except agriculture.
  - All airborne contaminants, including biological, are covered by the standard.
  - Employers must develop and implement a written Respiratory Protection Program.
  - Employers must use APFs and MUCs to ensure the proper selection of respiratory equipment.
  - Prior to respirator use in the workplace, employees must pass a medical evaluation and equipment fit test.
- Respiratory Protection Program (Program)
  - The Program must contain worksite specific procedures regarding selected respirator type, medical evaluations, fit testing, usage, maintenance & care, training, and recordkeeping.
  - The Program must be updated as necessary to reflect workplace changes that affect respirator use.
  - The Program must be administered by a suitably trained program administrator.
- Medical Evaluations
  - Employee must be medically evaluated for ability to use a respirator (prior to fit test or use).

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- Evaluations must be performed by a physician or other licensed health care professional (PLHCP).
- The PLHCP must use OSHA's medical questionnaire or initial medical exam that obtains the questionnaire information.
- Fit Testing
  - Prior to use, employees using a tight-fitting facepiece respirator, must be fit tested with the same make, model, style, and size of respirator that will be used.
  - Employees must pass an appropriate qualitative or quantitative fit test:
    - Prior to initial use
    - Whenever a different respirator facepiece (size, style, model, or make) is used
    - At least annually thereafter
      - Annual re-testing of facepiece fit detects poorly fitting respirators.
      - Waiting more than one year can result in a higher percentage of employees relying on poorly fitting respirators.
- Training
  - Employees must be trained such that they can demonstrate knowledge of at least:
  - Why the respirator is necessary and how improper fit, use or maintenance can compromise its protection
  - Limitations and capabilities of the respirator
  - How to inspect, put on and remove, use and check the seals; and
  - General requirements of the Respiratory Protection Standard



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## Small Entity Compliance Guide

### INTRODUCTION

This guide is intended to help small businesses comply with the Respiratory Protection standard. It provides guidance only, and does not alter or determine compliance responsibilities, which are set forth in Occupational Safety and Health Administration (OSHA) standards and the Occupational Safety and Health Act. The guide does not replace the official Respiratory Protection standard (29 CFR 1910.134), which is contained in Appendix I of this document. The reader must refer to the standard to ensure compliance. Moreover, because interpretations and enforcement policy may change over time, for additional guidance on OSHA compliance requirements, the reader should consult current administrative interpretations and decisions by the Occupational Safety and Health Review Commission and the courts.

The Respiratory Protection standard will protect an estimated 5 million respirator wearers working in 1.3 million workplaces. OSHA estimates that compliance with the standard will prevent hundreds of deaths and thousands of illnesses in U.S. workplaces each year.

The Respiratory Protection standard specifies only the minimum requirements for an effective respiratory protection program. You are encouraged to exceed these minimum criteria if doing so enhances the safety and health of your employees.

In 21 states and two territories, occupational respiratory requirements are enforced by the state agency responsible for the OSHA-approved state plan. These states are: Alaska, Arizona, California, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Virgin Islands, Washington and Wyoming. New York and Connecticut also operate OSHA-approved state plans limited in scope to state and local government employees.

State plans are required to adopt and enforce respiratory protection standards that are either identical to or at least as effective as the federal standard. These states are also required to extend the coverage of their respiratory protection standard to state and local government employees, including paid, and in some states, volunteer, firefighters, who are otherwise not covered by the federal standard. The information in this guide should be equally applicable to you if you are located in a state plan state, although you should check to see if there are any unique or additional requirements that may apply. (A list of phone numbers and addresses for the state programs is included in Appendix II.)

#### ***Who should read this guide?***

You should read this guide if it is likely that you will need to establish and implement a respiratory protection program for your business. Under the Respiratory Protection standard, OSHA may require you to establish a respiratory protection program when exposure to an airborne contaminant or to low oxygen levels can cause illness or injury to

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a worker's health, and when these health effects can be prevented by the appropriate selection and use of a respirator.

### ***How do I use this guide?***

The guide is divided into chapters that correspond to the major provisions, or paragraphs, of the Respiratory Protection standard (e.g. respirator selection—paragraph (d), fit testing—paragraph (f)). Each chapter follows the same organization as the corresponding paragraph of the standard, providing more detail than the standard itself to help you better understand the requirements. Standard citations (e.g. (d)(3)(ii)) are provided in the margins to enable you to refer from the explanations provided in this guide to the original standard, which is included in Appendix I. Checklists are provided at the end of each chapter.

In addition, Appendix III of this document contains *Questions and Answers on the Respiratory Protection standard (Q&A)*. If you do not find the answers to your particular questions in this document, check the Q&A.

Appendix IV of this guide contains a sample respiratory protection program. This sample program was written for a hypothetical company to provide an example of how the requirements of the Respiratory Protection standard may be appropriately implemented. Keep in mind that there is often more than one way to implement certain requirements of the standard in a particular workplace setting.

### ***What is a respirator?***

Respirators are devices that protect workers from inhaling harmful substances. These substances can be in the form of airborne vapors, gases, dust, fogs, fumes, mists, smokes, or sprays. Some respirators also ensure that workers do not breathe air that contains dangerously low levels of oxygen.

There are two major types of respirators:

1. Air-purifying respirators, which remove contaminants from the air.
2. Atmosphere-supplying respirators, which provide clean air from an uncontaminated source.

Respirators provide protection from respiratory hazards only when they are used properly.

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*Atmosphere supplying respirator*



*Air-purifying respirator*

### ***What is a respiratory protection program?***

A respiratory protection program is a cohesive collection of worksite-specific procedures and policies that addresses all respiratory protection elements required by the standard. For example, a respiratory protection program must contain specific procedures describing how respirators will be selected, fitted, used, maintained and inspected in a particular workplace. Chapter (c) of this guide contains more information on respiratory protection programs.

### ***When am I required to establish a respiratory protection program?***

Generally, whenever you or OSHA requires your employees to wear respirators. For example, you may need to establish a respiratory protection program:

- If your employees work in situations where the level of oxygen is insufficient, or potentially insufficient.
- If your employees are potentially exposed to harmful levels of hazardous gases or vapors.
- If your employees are exposed to other potential respiratory hazards, such as dust, mists, fumes, sprays, and other airborne particles.

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You need to supply workers with respirators when all preferred methods of protecting them from breathing contaminated air have been determined to be insufficient to reduce the contamination to nonhazardous levels. You must consider the potential for emergencies when making this determination. These preferred methods include:

- Engineering controls, such as ventilation.
- Substituting non-hazardous materials for the materials that pose respiratory hazards.
- Administrative controls, such as scheduling major maintenance for weekends or times when few workers are present.

If you have any questions about when to supply your employees with respirators, refer to the standard in Appendix I.

### ***What is OSHA's Respiratory Protection standard?***

The Respiratory Protection standard requires employers to establish and maintain a respiratory protection program to protect their respirator-wearing workers. OSHA has issued a revised standard, which became effective on October 5, 1998. It updates and replaces a standard that OSHA adopted in 1971. (The complete text of the revised standard is included in Appendix I.)

The revised standard incorporates new scientific principles and technologies that have emerged since 1971. Because of advances in technology, many areas covered by the previous standard had become outdated.

The new standard is intended to:

- Enhance the protection of worker health.
- Promote more effective use of respirators.
- Make it easier for you to comply with its provisions.
- Make it easier to understand the policy and procedures you must follow when implementing a respiratory protection program.

### ***How does the new standard differ from the old standard that it replaces?***

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The new standard:

- Contains new provisions that recognize the needs of small businesses.
- Requires written respiratory protection programs to include work-site specific procedures. (*See Section (c) of this guide.*)
- Requires that a qualified "program administrator" oversee the respiratory protection program. (*See page c-5 of this guide.*)
- Provides:
  - Definitions that will eliminate confusion about terminology and how these terms apply to respirators and their use. (*See Section (b) of the standard in Appendix I.*)
  - Criteria for selecting respirators. (*See Section (d) of this guide.*)
  - Clear language on the requirement for medical examinations of workers and the use of medical questionnaires. (*See Section (e) of this guide.*)
- Requires employers to perform a hazard determination to identify respiratory hazards and work conditions. (*See pages d-1 through d-4 of this guide.*)
- Requires annual fit testing for all tight-fitting respirators, and it includes protocols for fit testing. (*See Section (f) of this guide and Appendix B of the standard in Appendix I of this guide.*)
- Addresses the use of respirators in situations that OSHA characterizes as Immediately Dangerous to Life or Health (IDLH). (*See page g-6 of this guide.*)

### ***How does the new Respiratory Protection standard recognize the needs of small businesses?***

Among other things, the revised Respiratory Protection standard:

- Allows the use of a medical questionnaire to screen for employee health conditions which could affect most workers ability to use a respirator. The questionnaire must be administered by a physician or other licensed health care professional. (*See page e-2 of this guide.*)

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- Allows medical evaluations to be conducted either by a physician or by another licensed health care professional. (*See page e-2 of this guide.*)
- Requires medical evaluations after the initial evaluation to be conducted only when specific conditions indicate a need for a reevaluation. (*See page e-3 of this guide.*)
- Minimizes the amount of paperwork required in connection with medical evaluations. (*See pages e-5 through e-7 of this guide.*)
- Establishes flexible requirements for cleaning and disinfecting respirators issued to individual employees "as necessary to be maintained in a sanitary condition." (*See page h-1 of this guide.*)
- Allows tags be used to document respirator inspections rather than written records. (*See page h-3 of this guide.*)
- Allows you to obtain a certificate of breathing gas analysis from the supplier instead of requiring you to conduct your own gas analysis. (*See page i-2 of this guide.*)

### ***Whom can I contact if I have additional questions about the Respiratory Protection standard that are not answered in the Small Entity Compliance Guide?***

For additional assistance in establishing and implementing a respiratory protection program, contact the OSHA Area Office nearest you. If you are unable to contact your local OSHA Area Office, you can contact the appropriate OSHA Regional Office for information or assistance. A list of OSHA Area and Regional Offices is included as Appendix II.

The OSHA Consultation Service is an excellent resource for additional assistance. This free program helps employers find out about potential hazards and improve their occupational safety and health management systems. It is separate from the OSHA inspection effort. State OSHA Consultation programs are listed in Appendix II.

If you are located in a state that operates an OSHA-approved State Plan, you should contact the responsible state agency listed in Appendix II for information and assistance.

**Section (a): PERMISSIBLE PRACTICE**

**(a)(1) ENGINEERING CONTROLS**

To prevent illness or diseases caused by breathing hazardous air in the workplace, you must use engineering controls to the extent feasible to prevent contamination of the workplace atmosphere. When engineering controls are not feasible, or while engineering controls are being put in place, appropriate respirators must be used.

*How do I know if the atmosphere in my workplace is hazardous?*

An atmosphere is hazardous if it does not contain sufficient oxygen, or if it contains chemical, biological, or radiological contaminants in sufficient quantity to harm the health of employees. Section (d) of this guide contains information on how to identify and evaluate respiratory hazards in your workplace.

*What are engineering controls?*

Engineering controls physically change the work environment to reduce employee exposure to air contaminants. Such controls may include:

- Change of the work process
- Substitution of less hazardous substances for harmful materials
- Isolation or enclosure of the work process or of employees
- Local exhaust or general dilution ventilation

*Where can I find guidance on the type of engineering controls I may need to put in place?*

Potential sources for this type of information include:

- Trade associations.
- Manufacturers or suppliers of materials or equipment associated with the creation of air contaminants.

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- Your insurance carrier.
- Government agencies (see Appendix II of this guide for a list of OSHA offices in your area).
- OSHA Consultation Program (see Appendix II of this guide for the list of States with consultation programs).
- Industrial hygiene consultants.

### **(a)(2) PROVIDING YOUR EMPLOYEES WITH RESPIRATORS**

You must provide respirators when such equipment is necessary to protect the health of employees. The respirator provided must be suitable for its intended purpose. When you are required to provide respirators, you must establish and maintain a respiratory protection program. The requirements for a respiratory protection program are described in Section (c) of this guide.

#### ***How do I know if the engineering controls I install are sufficient to protect employee health?***

The vendor who supplies your engineering controls may be able to help you determine whether the controls will adequately protect your employees from respiratory hazards. You can also evaluate the level of contamination in your workplace after the engineering controls are installed, as explained in Section (d) of this document.

#### ***How do I know what type of respirator is suitable for protecting the health of my employees?***

Section (d) of this guide will answer your questions about selecting a suitable respirator.



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***Is worker rotation acceptable as an interim control while engineering control measures are being developed and implemented?***

Rotation is an acceptable practice for less-toxic contaminants. It is never permitted for protection against cancer-causing substances. In addition, many of OSHA's substance-specific health standards contain ceiling limits that do not allow the use of worker rotation. If respirators are also necessary to protect the health of the employee while engineering controls are being developed, they must be provided.

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### **Section (b): DEFINITIONS**

This section of the Respiratory Protection standard contains definitions of important terms used in the text of the standard. The definitions are intended to clarify the requirements of the standard. They are contained in Paragraph (b) of the standard, which is included as Appendix I of this guide.

## **Section (c): RESPIRATORY PROTECTION PROGRAM**

Whenever respirator use is required by you or by OSHA, this section of the Respiratory Protection standard dictates that you:

- Develop a written respiratory protection program with procedures that are specific to your worksite.
- Implement the program and update it as necessary.
- Assign a qualified program administrator to run and evaluate the program.

Additionally, you are required to ensure that certain aspects of the respiratory protection program are followed by employees who wear a respirator voluntarily (that is, they wear respirators even though respirator use is not required by either you or OSHA).

### **(c)(1) PROGRAM DEVELOPMENT AND IMPLEMENTATION**

You are required to develop and implement a written respiratory protection program and to update it as necessary.

#### **Program Development**

You must develop a written respiratory protection program that includes procedures for the use of respirators in any work areas where protection from respiratory hazards is required. The procedures in your program must be specific to your particular workplace.

All required elements of the respiratory protection program must be in writing unless a particular element does not apply to your workplace. For example, if you do not use atmosphere-supplying respirators, then you do not need to develop procedures for that type of respirator.

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### ***Why a written program?***

A written program is needed because health and safety programs can be more effectively implemented and evaluated if the procedures are available in a written form for study and review.

Also, a written respiratory protection program is the best way to ensure that the unique characteristics of the worksite are taken into account. Developing the written program encourages you to thoroughly assess and document information pertaining to respiratory hazards posed to your employees—both during normal operating conditions and during reasonably foreseeable emergencies.

### **Program Content**

You are required to include the following elements (as applicable) in your respiratory protection program:

- Procedures for
  - Selecting appropriate respirators for use in the workplace.
  - Fit testing tight-fitting respirators.
  - Using respirators properly in routine situations as well as in reasonably foreseeable emergencies.
  - Cleaning, disinfecting, storing, inspecting, repairing, removing from service or discarding, and otherwise maintaining respirators. Also, you must establish schedules for these elements.
  - Ensuring adequate air supply, quantity, and flow of breathing air for atmosphere-supplying respirators.
  - Regularly evaluating the effectiveness of the program.
- Provisions for medical evaluation of employees who must use respirators.
- Training employees in the proper use of respirators (including putting them on and removing them), the limitations on their use, and their maintenance.

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Appendix III, Sample Respiratory Protection Program, provides additional guidance on the required content of the respiratory protection program.

### **Program Implementation and Updating**

Once you have established a written program covering all the required elements that apply to your workplace, you then must ensure that the program is appropriately implemented. Implementation of the program must be administered and overseen by your program administrator (see section (c)(3)).

Once your program has been implemented you must ensure that it is updated *as necessary* to reflect relevant changes in the workplace. That is, you need to revise only the elements of the program that have been affected by changes that relate to respiratory hazards in work areas. For example, you would need to revise the appropriate sections of your written program if new processes or new chemicals were introduced into the workplace that will impact respirator usage. In addition, if you make any changes in the types of respirators used or in any of the other elements of the respiratory protection program, you must make appropriate revisions to the written program.

### **(c)(2) VOLUNTARY RESPIRATOR USE**

You are required to ensure that all employees who use a respirator voluntarily are provided with certain basic information on proper use. Additionally, you must ensure that certain of these workers are included in your program's provisions for medical evaluations, and for cleaning, storage, and maintenance of respirators.

***What is meant by "voluntary" use of respirator equipment?***

Voluntary use is when an employee chooses to wear a respirator, even though the use of a respirator is not required by either you or by any OSHA standard.

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### **Providing Basic Information to Voluntary Respirator Users**

You may allow an employee to use a respirator voluntarily, if you determine that the respirator itself will not present a hazard to the employee due to misuse, other hazards or conditions in the workplace, or employee medical conditions. In such cases, you may provide employees with respirators or allow them to use their own respiratory protection.

If you allow such use of a respirator, you must provide the voluntary respirator user with the advisory information in Appendix D of the standard (see Appendix I in this document). This appendix provides basic information on the proper use of respirators for employees who are voluntary users of the equipment and thus are not required to undergo training. These precautions can be presented to the employee either verbally or in a written form. (See also Section (k) of this guide on Training and Information.)

### **Applicable Components of the Respiratory Protection Program**

You must ensure that certain aspects of your respiratory protection program are implemented for voluntary respirator users. This requirement, however, does not apply for employees who voluntarily wear dust masks (filtering facepieces).



*Filtering facepieces*

Elements of the program that apply to voluntary users (except those using filtering facepieces (dust masks) voluntarily) involve:

- Provisions for medical evaluation of employees who use elastomeric respirators.
- Procedures for cleaning, disinfecting, storing, inspecting, repairing, removing from service or discarding, and otherwise maintaining respirators. Also, you must establish schedules for these program elements.

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Implementing these aspects of the program for a voluntary respirator user will ensure that the respirator is used properly and does not create a hazard to the user. If these provisions are not implemented, potential hazards or problems could result:

- A respirator wearer's health could be jeopardized due to an undetected medical condition (e.g., asthma, heart condition).
- A dirty respirator could cause dermatitis.
- A dirty or poorly disinfected respirator could cause an ingestion hazard.

### *What types of respirators do the voluntary use requirements apply to?*

This requirement applies primarily to tight-fitting negative pressure APRs, and it would also apply to powered APRs if an employee elected to voluntarily use this type of respirator. It does not apply to dust masks (filtering facepieces).

### *Do I need to have a written respiratory protection program if only voluntary users wear respirators at my facility?*

No, if the only respirators being worn voluntarily are filtering facepieces (dust masks).  
Yes, if APRs or powered APRs are being used voluntarily. But when this is the case, your written program needs to include only the elements that pertain to voluntary users: a section on medical evaluations, and one on inspection, care, and maintenance.

## **(c)(3) PROGRAM ADMINISTRATOR**

You must designate a program administrator to run the program and evaluate its effectiveness. An individual is qualified to be a program administrator if he or she has appropriate training or experience in accord with the program's level of complexity.

This training or experience is appropriate if it enables the program administrator to fulfill the minimum standard requirements of recognizing, evaluating, and controlling the hazards in your workplace. For example, if your program requires air-supplying respirators for use in immediately dangerous to life or health (IDLH) environments, your program administrator must

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have training and experience pertaining to the use of this type of equipment. Similarly, if you don't use air-supplying respirators and don't have significant respiratory hazards at your workplace, someone with less sophisticated experience or training might be able to effectively serve in this position.

Ultimately, the appropriate qualifications for your program administrator must be determined based on the particular respiratory hazards that exist, or that are reasonably anticipated, at your workplace.

### ***How do I, or a designated employee, become a qualified program administrator?***

If your workers are exposed only to nuisance dusts and relatively low-toxicity materials, and they use only a few types of relatively simple respirators, knowledge of this guide and materials supplied by the manufacturer may be sufficient for you, or a designated employee, to serve as the program administrator.

If more dangerous chemicals are present, if the potential for high exposures exists, or if sophisticated respirators are used, the program administrator must have more extensive experience and/or training. In these circumstances, you may need to seek out the expertise needed or obtain appropriate training.

### ***Is there a list of approved training courses I can send my program administrator to?***

No. OSHA does not provide a training course specifically to train respiratory protection program administrators, nor does OSHA require program administrators to attend a specified course. OSHA only requires the program administrator to have an adequate level of training or experience to deal with the complexity of the respiratory protection program at the worksite.

You may want to check with trade associations or adult education programs run by universities or technical and vocational schools in your area. The OSHA Consultation Program can help you identify appropriate training courses, or, if you hire a consultant to help you with aspects of your respiratory protection program, he or she may be able to help you with this.



***How will OSHA determine that a person is experienced and/or trained to be a respiratory protection program administrator?***

Usually, the OSHA compliance officer will review the written program and interview the respiratory protection program administrator. Questions asked during the interview are likely to focus on determining how familiar the program administrator is with the OSHA Respiratory Protection standard and the use and application of the respirators at the particular workplace. Significant deficiencies in the written program also could indicate a lack of training and understanding of the standard.

Only one person can fulfill the primary responsibilities of running the program, unless your company has more than one worksite. Under that circumstance, you may have a program administrator for each site. Ordinarily, however, you cannot divide the responsibilities among several employees. Requiring an administrator with sole responsibility helps ensure the integrity of the program by maintaining continuous oversight from one person. Nonetheless, the administrator may rely on other employees to help run parts of the respiratory protection program (e.g., fit testing, medical evaluations).

One of the program administrator's primary responsibilities is to evaluate the program. Although OSHA recognizes the value of an objective assessment, the Agency did not want to burden small businesses with the cost of arranging for an outside party to conduct the evaluations, and the standard therefore allows program administrators to perform the program evaluations required under the standard.

**(c)(4) EMPLOYER-PROVIDED RESPIRATORS**

You must provide respirators, training, and medical evaluations at no cost to employees who are required to wear a respirator for protection from respiratory hazards at your workplace. This requirement reflects the philosophy that employers are obligated to provide and pay for necessary personal protective equipment (such as respirators) used by employees on the job.

***Do I also have to pay for respirators for voluntary users?***

No. You do not have to pay for respirators for voluntary respirator users. In such cases, you still must pay for required medical evaluations for voluntary users and provide voluntary users with appropriate facilities and time to clean, disinfect, maintain, and store respirators.

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### **CHECKLIST FOR RESPIRATORY PROTECTION PROGRAMS**

Check to ensure that your facility has:

- A written respiratory protection program that is specific to your workplace and covers the following:
  - Procedures for selecting respirators.
  - Medical evaluations of employees required to wear respirators.
  - Fit testing procedures.
  - Routine use procedures and emergency respirator use procedures.
  - Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and maintaining respirators.
  - Procedures for ensuring adequate air quality for supplied air respirators.
  - Training in respiratory hazards.
  - Training in proper use and maintenance of respirators.
  - Program evaluation procedures.
  - Procedures for ensuring that workers who voluntarily wear respirators (excluding filtering facepieces) comply with the medical evaluation, and cleaning, storing and maintenance requirements of the standard.
- A designated program administrator who is qualified to administer the program.
- Updated the written program as necessary to account for changes in the workplace affecting respirator use.
- Provided equipment, training, and medical evaluations at no cost to employees.

## Section (d): RESPIRATOR SELECTION

### **(d)(1) GENERAL GUIDELINES FOR SELECTION**

You must base selections of respirators on the hazards to which your employees are exposed and must consider how workplace and user factors affect respirator performance and reliability.

#### *What are workplace and user factors?*

Some examples include the following:

- The size and configuration of the workspace—Are workers equipped with air supplied respirators able to fit into any tight space in your workplace?
- Ease of worker communication—Are your employees wearing respirators able to communicate with one another and warn one another of hazards?
- Ease or difficulty of the work or rate of activity—Are your employees doing heavy lifting that may deplete the air supply of a self-contained breathing apparatus (SCBA)? Would a fast work pace lead to discomfort, causing the employee to move the respirator and, thus, affect the fit?
- Workplace conditions such as temperature and humidity or the location and movement of other personnel and equipment—Would the temperature and humidity affect the effectiveness of filters, cartridges, and other respirator parts as well as the comfort of the wearer? Would the mobility of your employees or the presence of moving machinery entangle the airlines of atmosphere-supplying respirators?

### **(d)(1)(iii) You need to Identify and Evaluate Worksite Hazards**

- Identify the chemicals to which your employees are exposed and evaluate the hazards of those chemicals.
- Determine the state and physical form of the chemical. Are they solids, liquids, or gases? Do the liquids and solids give off vapors or do they form dusts or mists?
- Estimate or measure employee exposures to the hazards.

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### ***Respiratory hazards may be present in the workplace in the following physical forms:***

***Dusts and fibers*** are solid particles that are formed or generated from solid materials through mechanical processes such as crushing, grinding, drilling, abrading or blasting. Examples are lead, silica, and asbestos.

***Fumes*** are solid particles that are formed when a metal or other solid vaporizes and the molecules condense (or solidify) in cool air. Examples are metal fumes from smelting or welding. Fumes also may be formed from processes such as plastic injection or extrusion molding.

***Mists*** are tiny droplets of liquid suspended in the air. Examples are oil mist produced from lubricants used in metal cutting operations, acid mists from electroplating, and paint spray mist from spraying operations.

***Gases*** are materials that exist as individual molecules in the air at room temperature. Examples are welding gases, such as acetylene and nitrogen, and carbon monoxide produced from internal combustion engines.

***Vapors*** are the gaseous form of substances that are normally in the solid or liquid state at room temperature and pressure. They are formed by evaporation. Most solvents produce vapors. Examples include toluene and methylene chloride.

***Biological hazards*** include bacteria, viruses, fungi, and other living organisms that can cause acute and chronic infections if breathed in. Examples include Legionnaire's Disease, flour, and animal products (dander, excreta).

### **Some Suggestions for Measuring or Making "Reasonable" Estimates of Worker Exposures**

- Personal monitoring is the most accurate way of obtaining worker exposure information. Sampling equipment and analytical methods are available for the vast majority of substances regulated by OSHA's Air Contaminants standard (29 CFR 1910.1000 and 29 CFR 1926.55). OSHA has specific monitoring requirements for its substance-specific standards (i.e., benzene or asbestos). See Subpart Z of *Title 29 Code of Federal Regulations*, parts 1910 and 1926, for OSHA's substance-specific standards.

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- You can also estimate exposures by monitoring fixed locations or by sampling for short time durations. If you do this, you should measure under worst case conditions to be sure you are providing adequate protection for your employees. For example, if you select a respirator based on a reading obtained from a fixed sample collected close to the source of emission, the respirator may provide adequate worker protection because workers generally move about and do not spend their workshift near the source of emissions. Similarly, a respirator selected on the basis of the reading obtained from a spot sample taken when the process is operating at peak conditions may provide adequate protection because process emissions under non-peak conditions are less than at peak conditions.
- Data may be available to you from previous exposure measurements. For example, studies may have been conducted in your industry. Your trade association may have data, or, manufacturers of products or materials used in your workplace may have conducted laboratory tests that provide worker exposure data. To generalize from data obtained from these sources or an industry-wide survey, however, you must show that the conditions that existed in the survey, such as the processes, types of materials, control methods, work practices, and environmental conditions, are similar to those in your own workplace.
- You should be aware that exposures can be quite variable from day to day and from worker to worker. It is therefore important always to err on the side of over- rather than underprotection.
- You may wish to consult with health and safety professionals in evaluating exposures. However, consultation is not mandatory. The respiratory protection program administrator should have the necessary qualifications. You can probably obtain consultants through the organizations listed in the sources of help at the end of this chapter. The OSHA Consultation Program (see Appendix II for a list of programs by state) and your insurance carrier are other potential sources of assistance.

### *What if I am unable to determine my employees' exposure?*

You must consider the worksite atmosphere IDLH, Immediately Dangerous to Life or Health and select respirators on that basis. IDLH means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere (29 CFR 1910.134 paragraph (b)). However, you may be able to demonstrate, through information on processes and reasonable assumptions about potential maximum concentrations, that IDLH conditions would not occur.

### **(d)(1)(ii) You Must Select a Respirator Certified by the National Institute for Occupational Safety**

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**and Health (NIOSH).** The respirator must be used in compliance with the conditions of its certification. See the sources of help at the end of this chapter for addresses and telephone numbers of NIOSH.

### **(d)(2) RESPIRATORS FOR IDLH ATMOSPHERES**

#### **(d)(2)(i) Types of respirators**

IDLH environments require the highest level of respiratory protection and reliability. You must provide either of the following for use in IDLH environments:

- Full-facepiece pressure-demand SCBAs that are certified by NIOSH for a minimum service life of 30 minutes.



*Full facepiece SCBA*

- Combination full-facepiece pressure-demand supplied-air respirators with auxiliary self-contained air supply.

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(d)(2)(ii) Respirators for escape from IDLH atmospheres **must be NIOSH certified for escape from the atmosphere in which they will be used.** For example, for formaldehyde exposures, escape respirators may be a full facepiece with chin style, front, or back-mounted industrial canister approved against formaldehyde (29 CFR 1910.1048).



*Emergency escape breathing apparatus*

(d)(2)(iii) **You must consider all oxygen-deficient atmospheres to be IDLH.** Atmosphere-supplying respirators must be used in oxygen-deficient atmospheres (where oxygen is less than 19.5%). You may use any atmosphere-supplying respirator if you can demonstrate that, under all reasonable foreseeable conditions, the oxygen concentration in the work area can be maintained within the ranges specified in the following table (Table II of 29 CFR 1910.134). Otherwise, you must provide employees with full facepiece pressure demand SCBAs or combination full facepiece pressure demand supplied-air respirators with auxiliary self-contained air supply.

**TABLE 1**

<b>Altitude</b>	<b>Oxygen deficient atmospheres (% O<sub>2</sub>) for which the employer may rely on any atmosphere supplying respirator.</b>
Less than 3001.....	16.0-19.5
3001-4000.....	16.4-19.5
4001-5000.....	17.1-19.5
5001-6000.....	17.8-19.5
6001-7000.....	18.5-19.5
7001-8000.....	19.3-19.5

Above 8000 feet the exception does not apply. Oxygen-enriched breathing air must be supplied above 14,000 feet.

Table 1 specifies, by altitude, the oxygen concentrations in which any type of atmosphere-

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supplying respirators may be used. For example, if your workplace is located at sea level and you can demonstrate that the oxygen content in the oxygen deficient environment will be maintained between 17 and 19%, then you may use any atmosphere-supplying respirator.

Work operations being conducted in well-controlled atmospheres where oxygen levels are deficient (below 19.5 percent) are typically permit-required confined spaces (see OSHA's Permit-Required Confined Space standard, 29 CFR 1910.146).

### **(d)(3) RESPIRATORS FOR NON-IDLH ATMOSPHERES**

**(d)(3)(i) You must provide respirators that are adequate to protect employee health and ensure compliance with all other OSHA requirements under routine and reasonably foreseeable emergency situations.** Other OSHA regulations include the Air Contaminants standard, 29 CFR 1910.1000, the substance-specific standards, appropriate safety regulations such as the Hazardous Waste Operations and Emergency Response standard, 29 CFR 1910.120 paragraph (g)(2), and many construction and maritime standards.

Also, the General Duty Clause of the Occupational Safety and Health Act requires you to protect your employees from substances not regulated by OSHA, but which are known to be hazardous at levels encountered in the workplace. Consult the Material Safety Data Sheet (MSDS) sent by your chemical supplier if you have questions about the toxicity of a particular substance. For further assistance in ascertaining whether substances used in your workplace that are not regulated by OSHA are hazardous, see the sources of help (at the end of this chapter) and the list of OSHA Area Offices (Appendix II).

**(d)(3)(ii) You must select respirators that are appropriate for the chemical state and physical form of the contaminant.** See the section discussing the identification of worksite hazards. You need different types of filters, cartridges, and canisters depending on whether dusts, fumes, mists, vapors, and gases are present in your workplace and depending on the kinds and concentrations of substances present. Refer to NIOSH and the other sources of help listed at the end of this chapter.



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### *(d)(3)(iii)* Respiratory protection for gases and vapors

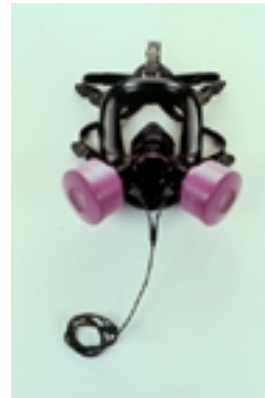
**For protection against gases and vapors, you can select either atmosphere-supplying respirators or air-purifying respirators.**



*Half-facepiece SAR*



*Full-facepiece SCBA*



*Full facepiece PAPR*



*Half-facepiece APR*

You must meet the following conditions if your employees use air-purifying respirators.

- The respirator must be equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant; or
- If there is no appropriate ESLI, you must implement a change schedule for canisters and cartridges based on objective information that will ensure that canisters and cartridges are changed before the end of their service life.

You do not want to have situations where the canisters or cartridges become saturated and the gases or vapors break through the canisters or cartridges, allowing the contaminants to get inside the mask and into your employees' breathing zones.

***Why not just rely on the employee's ability to detect the odor of the substance when the gas or vapor breaks through?***

You may not rely on the detection of odor as protection against respiratory hazards posed by gases and vapors because:

- Most toxic substances do not have appropriate sensory (odor or irritant) warning properties.
- Some chemicals have odors that are only detectable above their established exposure limits, meaning the employees will smell the chemical only after they have already been exposed to unsafe levels of the contaminant.
- Individuals' abilities to perceive particular odors may differ quite markedly from the population average due to any of a variety of innate, chronic, or acute physiological conditions. For example, about 10 percent of people have a markedly impaired sense of smell.
- There is no good screening mechanism to identify persons with sensory receptor problems.
- Continuing exposure to the odor usually results in diminution or even disappearance of the smell sensation. This phenomenon is known as olfactory fatigue. When this happens, the worker unknowingly gets used to the contaminant breaking through the cartridge/canister and loses the ability to detect its smell.

***What is an end of service life indicator (ESLI)?***

An ESLI is a mechanism for warning the user that a respirator is approaching the end of its ability to provide protection. The warning appears on the cartridge itself. For example, after a period of use, an indicator on a cartridge with sorbent material will signal that protection against organic vapors is approaching saturation or is no longer effective.

So far, NIOSH has approved ESLIs for only four cartridges or canisters (mercury vapor, carbon monoxide, ethylene oxide and hydrogen sulfide). Thus, you most likely will have to establish change schedules to ensure that cartridges and canisters are changed before their end-of-service-life.

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### ***What must be considered when developing change schedules?***

You must develop cartridge change schedules based on available data or information that can be relied upon to ensure that cartridges are changed before the end of their useful service life.

### **You need to consider the following factors in determining change schedules:**

- The contaminants the respirator is to protect against.
- The concentrations of contaminants in the work area.
- Frequency of use—(e.g., is the respirator used continuously or intermittently throughout the shift?)
- Temperature, humidity and air flow through the cartridge or canister.
- Employees' work rates.
- The presence of other potentially interfering chemicals.

You should assume worst case conditions to avoid breakthrough earlier than anticipated. You should document the information relied upon and the basis for the change schedules you use in your written respiratory protection program.

### ***Where can I get help on developing change schedules?***

You must consult with your respirator supplier or manufacturer for guidance on developing change schedules specific to your work conditions. Some suppliers have prepared materials that may assist you with developing change schedules for your worksite. Other possible sources of help include your trade association, and/or the resources listed at the end of this chapter.

Further information to help you develop change schedules is forthcoming. Several trade associations are currently gathering published information, such as breakthrough test data (i.e., how long it takes a substance to break through the cartridge or canister and get into the facepiece), and plan to produce a guidance document to help employers develop change schedules. OSHA is also developing instructional materials on change schedules, which will be a useful tool for employers

**(d)(3)(iv) Respiratory protection for particulates**

***What are my options for protection against particulates?***

You have three options:

- Atmosphere-supplying respirators.
- Air-purifying respirators (including filtering facepieces) with filters certified by NIOSH under 30 CFR part 11 as high efficiency particulate (HEPA) filters, or filters certified by NIOSH under 42 part 84.
- Air-purifying respirators with any filter certified for particulates by NIOSH for protection against contaminants consisting primarily of particles with mass median aerodynamic diameters (MMAD) of at least two micrometers.



*Particulate APR, N95*

See the sources of help section at the end of this chapter for advice and information in determining whether or not contaminants in your workplace consist primarily of particles of two micrometers or more.

***What types of particulate filters are available for air-purifying respirators (APRs)?***

Particulate-removing cartridges contain filters that reduce inhaled concentrations of toxic dusts and fiber, such as lead and asbestos, fumes, mists, and radioactive and biological materials (such as grain dusts). Powered and non-powered APRs require different particulate filters. Only HEPA filters are appropriate for protection against particulates for powered APRs.

The nine filter types for use with non-powered APRs are based on three levels of filter

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efficiency and three levels of resistance to degradation by oil. The three levels of filter efficiency are 95, 99, and 99.97 percent. These are referred to as 95, 99 and 100 filters, respectively. The three levels of oil resistance are N (non oil resistant), R (oil resistant) and P (oil proof). The most common commercially available cartridges are the "N95" (not oil resistant and 95 percent efficient) and "P100" (oil proof and 99.97 percent efficient). The P100 is comparable to the HEPA filter that is used with PAPRs.

### ***Do I need to use particulate filters with ESLI?***

ESLIs are not needed with particulate-removing filters. The employee should be trained to change the filter when he or she has difficulty breathing due to a lack of air being drawn through the filter. This is an indication that the filter has become loaded with particulate.

### ***Where can I go for help?***

Sources of help include:

- *NIOSH Respirator Decision Logic*. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health. Request DHHS (NIOSH) Publication No. 87-108. NIOSH also has a help line. The telephone number is 1-800-35 NIOSH.
- American National Standard for Respiratory Protection (ANSI Z88.2). American National Standards Institute, 11 West 42nd Street, New York, New York, 10036.
- Respirator manufacturers provide advice through product literature, sales staff, and telephone help lines. The Industrial Safety Equipment Association (ISEA) has contact information. ISEA can be reached at: 1901 N. Moore Street, Suite 808, Arlington VA. 22209, or (703) 525-1695, or [www.safetycentral.org/isea](http://www.safetycentral.org/isea).
- Chemical manufacturers may provide information on the nature and properties of substances to which your employees may be exposed. You should be able to obtain information from the Material Safety Data Sheets (MSDSs) provided by the supplier of the chemical.
- You can contact the American Conference of Governmental Industrial Hygienists (ACGIH), 6500 Glenway Ave., Bldg. D-7, Cincinnati, Ohio, 45211-4438 for advice and information on exposure measurement and estimation and other related industrial hygiene subjects. ACGIH has published the ACGIH Ventilation

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Manual, which contains calculations applied to certain situations to estimate worker exposures.

- You can also contact the American Industrial Hygiene Association (AIHA), 2700 Prosperity Ave., Suite 250, Fairfax, Virginia, 22031 for advice and information on exposure measurement and estimation. Members of AIHA's Exposure Assessment Strategy's Committee are knowledgeable in worker exposure measurement and estimation.
- The National Library of Medicine provides free online help about chemical hazards. Through TOXNET, located at <http://toxnet.nlm.nih.gov/servlets/simple-search>, you can search a number of databases on toxicology, hazardous chemicals and other related subjects for information on respiratory hazards.

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### CHECKLIST FOR RESPIRATOR SELECTION

Check that at your facility:

- Respiratory hazards in your workplace have been identified and evaluated.
- Employee exposures that have not been, or cannot be, evaluated are considered IDLH.
- Respirators are NIOSH certified, and used under the conditions of certification.
- Respirators are selected based on the workplace hazards evaluated and workplace and user factors affecting respirator performance and reliability.
- A sufficient number of respirator sizes and models are provided to be acceptable and correctly fit the users.
- For IDLH atmospheres:
  - Full facepiece pressure demand SARs with auxiliary SCBA unit or full facepiece pressure demand SCBAs, with a minimum service life of 30 minutes, are provided.
  - Respirators used for escape only are NIOSH certified for the atmosphere in which they will be used.
  - Oxygen deficient atmospheres are considered IDLH.
- For Non-IDLH atmospheres:
  - Respirators selected are appropriate for the chemical state and physical form of the contaminant.
  - Air-purifying respirators used for protection against gases and vapors are equipped with ESLIs or a change schedule has been implemented.
  - Air-purifying respirators used for protection against particulates are equipped with NIOSH-certified HEPA filters or other filters certified by NIOSH for particulates under 42 CFR part 84.

## Section (e): MEDICAL EVALUATION

This section of the Respiratory Protection standard requires employers to implement medical evaluations to determine a worker's ability to use a respirator.

This requirement is necessary because using a respirator may place a burden on a worker's health. This burden varies according to a number of factors, such as the weight and breathing resistance of the respirator and the workplace conditions under which the respirator is worn. Specific medical conditions that may place an employee at increased risk of illness, injury, or death include:

- Cardiovascular and respiratory disease, such as high blood pressure, angina, asthma, chronic bronchitis, or emphysema.
- Cardiovascular damage caused by heart attack or stroke.
- Reduced lung function caused by factors such as smoking or prior exposure to respiratory hazards.
- Neurological disorders, such as epilepsy.
- Musculoskeletal disorders, such as lower back pain.
- Psychological conditions, such as claustrophobia and severe anxiety.

### *(e)(1)* EMPLOYER-PROVIDED MEDICAL EVALUATIONS

You must provide an employee with a medical evaluation to determine his or her ability to use a respirator. If a worker refuses to be medically evaluated for the use of a respirator, he or she cannot perform a job that requires a respirator.

#### *When do I need to provide an employee with a medical evaluation?*

The medical evaluation must be provided *before* the employee is fit tested and uses the respirator in your workplace for the first time.

You may stop providing a worker with medical evaluations when the worker is no longer required to use a respirator.



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### ***Are medical evaluations required for all types of respirators?***

Medical evaluations are required for both positive pressure and negative pressure respirators (except for filtering facepieces (dust masks) used on a voluntary basis).

When elastomeric or supplied-air respirators are worn voluntarily by workers (not required by you or OSHA), you must ensure that the workers are medically able to wear the respirators and that they are provided with the information in Appendix D to the standard. The procedures for making this medical determination must be part of a written respiratory protection program. When your employees wear dust masks (filtering facepiece respirators), however, no written medical-determination procedures are required.

### ***Do I need to provide medical evaluations for seasonal and temporary workers?***

You must provide seasonal and temporary workers with medical evaluations. The frequency or length of a worker's term of employment does not affect the requirement for medical evaluations.

## **(e)(2) MEDICAL EVALUATION PROCEDURES**

This portion of the standard specifies that the medical evaluation can be performed by using a medical questionnaire or by an initial medical examination that obtains the same information as the medical questionnaire.

### **Identification of a Medical Professional**

Employers must identify a physician or another licensed health care professional (PLHCP) to perform the medical evaluations.

### ***Who can perform a medical evaluation?***

Physicians are not the only health care professionals allowed to perform medical evaluations for respirator use. The Respiratory Protection standard allows any PLHCP to administer the medical questionnaire (described below) or to conduct the medical examination if doing so is within the scope of the PLHCP's license. You must check with PLHCPs in your local area to see if performing the medical evaluation is within the scope of their professional license. Or you may check with your state licensing board. Appendix IV, Questions and Answers on the Respiratory Protection standard, lists state

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licensing boards.

### *Can a nurse perform a medical evaluation?*

Any health care professional, including a nurse, who qualifies as a PLHCP can perform a medical evaluation. If a nurse does not qualify as a PLHCP, he or she may still be able to perform a medical evaluation if he or she is doing so under the supervision of a physician, and the physician performs the final review of the assessment.

### *Can an employee request to see his or her own physician for a medical evaluation?*

Yes, but you may find this arrangement difficult to administer. If employees select their own physicians, you will need to maintain contact with each physician, and you will need to send each physician the supplemental information described in paragraph (e)(5) of the standard. You must allow the employee to be evaluated during the employee's normal working hours or at a time that is convenient to the employee, and you also are responsible for paying for this service (even if the employee has coverage under an insurance plan).

**The Medical Questionnaire:** The medical questionnaire is designed to identify general medical conditions that place employees who use respirators at risk of serious medical consequences.

If you choose to use the medical questionnaire to conduct the medical evaluation, you must use the questionnaire contained in the Respiratory Protection standard (Appendix C of the standard, Sections 1 and 2). The language in Appendix C of the standard is mandatory and cannot be altered. The PLHCP determines whether or not Part B of the questionnaire needs to be administered, and the PLHCP can alter the questions in Part B in any manner he or she thinks is appropriate.

You may choose to use medical examinations in place of the questionnaire, but you are not required to do so. Although the questionnaire does not have to be administered during the medical examination, the PLHCP must obtain the same information from the worker that is contained in the questionnaire.

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### **(e)(3) FOLLOW-UP MEDICAL EXAMINATIONS**

You must provide follow-up examinations for employees who give positive answers to any of the questions numbered 1 through 8 in Section 2, Part A. You must also provide follow-up exams to employees who will be using SCBAs or full-face respirators who respond positively to questions 10 through 15. See Appendix C of the standard (Appendix I of this document). Also, you must provide a follow-up examination if the questionnaire or initial medical examination indicates that one is necessary.

As part of the follow-up examination, the PLHCP may include any tests, consultations, or diagnostic procedures that are needed to make a final determination about an employee's ability to use a respirator. In some cases, all that might be needed is a phone call to the employee from the PLHCP to clarify an issue from the questionnaire.

A PLHCP may investigate a medical condition that is not addressed in the questionnaire if the PLHCP has reason to believe that the condition could affect the employee's ability to wear a respirator.

If the PLHCP is not a physician, some medical issues may arise during the follow-up examination that may be outside the scope of the PLHCP's license. In such cases, a physician must be involved.

### **(e)(4) ADMINISTRATION OF QUESTIONNAIRES AND EXAMINATIONS**

**Procedures for Administering the Medical Evaluation:** When you provide a medical evaluation program:

- You must protect the confidentiality of the employee who is being evaluated.
- The questionnaire or medical examination must be given during an employee's normal work hours or at a time and place convenient to the employee.
- The employee must understand the questions on the medical questionnaire.

#### ***Who pays for the medical evaluation?***

You must pay for the medical evaluation and any related expenses—including travel costs—incurred by your employee during the evaluation.

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### ***How can I ensure that an employee's medical evaluation remains confidential?***

You must provide your employees with instructions on how to deliver or send the completed questionnaire to the PLHCP who will review it. This can be done, for example, by supplying them with stamped, pre-addressed envelopes for mailing their completed questionnaires to the PLHCP.

### ***If an employee does not speak English or cannot read, how can I make sure that he or she understands the questions on the medical questionnaire?***

You can send the employee directly to a PLHCP who is able to help the employee fill out the questionnaire. For non-English speakers, you may want to consider supplying an interpreter to help the PLHCP interpret the questionnaire for your employee. The standard does not require you to hire a professional interpreter; instead, you may use an English-speaking family member or friend of the employee, or another employee who speaks both English and the employee's language, who can help the employee fill out the questionnaire.

## **Employee's Right to Contact the PLHCP**

The standard requires you to inform employees that a PLHCP is available to discuss the medical questionnaire with them, and to allow employees to discuss the results of their questionnaire with the PLHCP. This discussion will enable employees and PLHCPs to clarify questions that were asked on the questionnaire, and for employees to explain answers that they provided.

### ***How can I notify employees about how to contact the PLHCP?***

You could post the PLHCP's name and telephone number in a location that is easily accessible to all workers (such as a lunch room or break area). You could also include the information in a separate sheet with the medical questionnaire.

## **(e)(5) SUPPLEMENTAL INFORMATION FOR THE PLHCP**

This portion of the Respiratory Protection standard requires you to provide the PLHCP with specific information to be used to make the determination about an employee's ability to use a respirator. This information includes:

- The type and weight of the respirator to be worn by the employee.

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- The duration and frequency of respirator use (including use for rescue and escape).
- The level of physical effort that the employee would be expending while wearing a respirator.
- Additional personal protective clothing and equipment that the employee would wear.
- The temperature and humidity extremes that may be encountered in the work environment where respirator use is required.

In addition, you must provide the PLHCP with the following:

- A copy of your written respiratory protection program.
- A copy of the Respiratory Protection standard.

### ***Why do I need to provide the PLHCP with a copy of the written respiratory protection program and the Respiratory Protection standard?***

This requirement helps ensure that PLHCPs have a thorough understanding of their duties and responsibilities in the medical evaluation process. Your written respiratory protection program will provide the PLHCP with critical information about the working conditions that could increase the burden placed on the employee's health during respirator use.

### ***Does the PLHCP need to visit the worksite to perform a medical evaluation?***

No, the supplemental information required in this portion of the standard is sufficient for the PLHCP to make a valid recommendation on the employee's ability to wear a respirator. OSHA, however, encourages PLHCPs to visit the worksite if they believe the information obtained there would be useful to them.

### ***If I select a new PLHCP, do I need to have my employees reevaluated?***

No, but you must make sure that the new PLHCP has the information required in this section. You must either provide the information directly to the new PLHCP, or you must make sure that the information is transferred from the former PLHCP to the new PLHCP.

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### ***How often do I need to provide the PLHCP with supplemental information?***

You need to supply the information to the PLHCP only when the conditions of respirator usage change.

### **(e)(6) MEDICAL DETERMINATION**

This portion of the standard requires you to obtain a recommendation from the PLHCP about the employee's ability to use a respirator. The PLHCP's recommendation must be in writing, and it must include the following information:

- A determination of whether or not the employee is medically able to use a respirator.
- Any limitations on respirator use related to the medical condition of the employee or to the workplace conditions in which the respirator will be used.
- The need, if any, for follow-up medical evaluations.
- A statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation.

Note that you are required to have the PLHCP provide a copy of the written recommendation to each employee.

### ***Who is responsible for making the final decision about an employee's ability to wear a respirator?***

You are responsible for making the final determination. The PLHCP's opinion is an important factor that you must consider in making this determination.

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***Is the information from the medical evaluation confidential, or can the PLHCP share this information with me?***

The PLHCP must keep strictly confidential any information revealed during the medical evaluation; your access is limited to the information contained in the PLHCP's written recommendation.

***Can I receive a copy of the employee's completed medical questionnaire?***

No, you must only maintain a copy of the PLHCP's written recommendation in a confidential file.

**Negative Pressure Respirators:** If the PLHCP determines that an employee is unable to wear a negative pressure respirator, perhaps because of a breathing problem such as asthma or bronchitis, but would be able to wear a powered air-purifying respirator (PAPR), you must provide the employee with a PAPR. If, however, the PLHCP determines in a subsequent medical evaluation that the worker can wear a negative pressure respirator, you no longer need to provide the worker with a PAPR.



*PAPR*

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### (e)(7) **ADDITIONAL MEDICAL EVALUATIONS**

This portion of the standard requires you to provide an employee with additional medical evaluations whenever the following events occur:

- The employee reports symptoms related to his or her ability to use a respirator.
- The PLHCP, respiratory protection program administrator, or supervisor determines that a medical reevaluation is necessary.
- Information from the respiratory protection program suggests a need for reevaluation.
- Workplace conditions (such as protective clothing, temperature, or level of work effort) have changed so that an increased burden is placed on the employee's health.

***Do I need to provide my employees with a medical reevaluation annually or according to some other fixed schedule?***

Yes, you must provide medical reevaluations in accordance with the PLHCP's recommendation.

***Do I need to provide an employee who is unable to use a respirator with an alternative job at no loss of pay and other benefits?***

Although the standard does not require that employees receive such benefits, other OSHA substance-specific standards may contain this requirement.



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### CHECKLIST FOR MEDICAL EVALUATION

Check that at your facility:

- All employees have been evaluated to determine their ability to wear a respirator prior to being fit tested for or wearing a respirator for the first time in your workplace.
- A physician or other licensed health care professional (PLHCP) has been identified to perform the medical evaluations.
- The medical evaluations obtain the information requested in Sections 1 and 2, Part A of Appendix C of the standard, 29 CFR 1910.134.
- Employees are provided follow-up medical exams if they answer positively to any of questions 1 through 8 in Section 2, Part A of Appendix C, or if their initial medical evaluation reveals that a follow-up exam is needed.
- Medical evaluations are administered confidentially during normal work hours, and in a manner that is understandable to employees.
- Employees are provided the opportunity to discuss the medical evaluation results with the PLHCP.
- The following supplemental information is provided to the PLHCP before he or she makes a decision about respirator use:
  - Type and weight of the respirator.
  - Duration and frequency of respirator use.
  - Expected physical work effort.
  - Additional protective clothing to be worn.
  - Potential temperature and humidity extremes.
  - Written copies of the respiratory protection program and the Respiratory Protection standard.

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### **CHECKLIST FOR MEDICAL EVALUATION (cont.)**

- Written recommendations are obtained from the PLHCP regarding each employee's ability to wear a respirator, and that the PLHCP has given the employee a copy of these recommendations.
- Employees who are medically unable to wear a negative pressure respirator are provided with a powered air-purifying respirator (PAPR) if they are found by the PLHCP to be medically able to use a PAPR.
- Employees are given additional medical evaluations when:
  - The employee reports symptoms related to his or her ability to use a respirator.
  - The PLHCP, respiratory protection program administrator, or supervisor determines that a medical reevaluation is necessary.
  - Information from the respiratory protection program suggests a need for reevaluation.
  - Workplace conditions have changed in a way that could potentially place an increased burden on the employee's health.

## **Section (f): FIT TESTING**

This section of the Respiratory Protection standard requires you to conduct fit testing on all employees who are required to wear a respirator that includes a tight-fitting facepiece.

Fit testing is a procedure used to determine how well a respirator “fits”—that is, whether the respirator forms a seal on the user’s face. If a good facepiece-to-face seal is not achieved, the respirator will provide a lower level of protection than it was designed to provide. For example, without a good seal, the respirator can allow contaminants to leak into the user’s breathing air.

This section also describes:

- What types of respirators must be fit tested
- How often fit testing must be conducted
- What procedures must be used
- How the results of fit testing should be used to guide respirator selection

### **INTRODUCTORY CONCEPTS**

As a general introduction to the topic of fit testing, several fundamental concepts are defined below. These definitions expand on those provided with the actual standard (see Appendix I of this guide).

As described below, there are two types of fit testing: quantitative and qualitative.

#### ***What is quantitative fit testing (QNFT)?***

Quantitative fit testing is a method of measuring the amount of leakage into a respirator. It is a numeric assessment of how well a respirator fits a particular individual.

To quantitatively fit test a respirator, sampling probes or other measuring device must be placed to measure aerosol concentrations both outside and on the inside of the respirator facepiece. The respirator wearer then performs the user seal checks followed by the selected QNFT.

- For the generated aerosol QNFT, he or she stands inside a “test chamber” (booth

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or hood), where a nontoxic aerosol is introduced into the air. Measurements are then taken of the aerosol concentration both inside the test chamber and inside the respirator. An assessment of the quantitative fit is made based on the ratio of the aerosol concentration inside the test chamber to the concentration inside the facepiece.

- For the condensation nuclei counter QNFT, ambient air particles are used as the test aerosol with measurements made of their concentration outside and inside the facepiece, and an assessment is made of the quantitative fit of the facepiece.
- The controlled negative pressure QNFT method uses a fit test instrument to exhaust air from inside the respirator facepiece to maintain a constant negative pressure. The measurement of the exhaust stream required to maintain a constant negative pressure yields a measure of the leakage into the facepiece.

Detailed protocols for quantitative fit testing are provided as part of the standard (see Appendix A of the standard in Appendix I of this document).



*Fit test adapter*



*Facepiece with fit test adapter inserted*

### ***What is qualitative fit testing (QLFT)?***

Qualitative fit testing is a non-numeric pass/fail test that relies on the respirator wearer's response to a substance ("test agent") used in the test to determine respirator fit.

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In qualitative fit testing, after performing user seal checks, the respirator wearer stands in an enclosure and a test agent is introduced, such as:

- Banana oil (isoamyl acetate)
- Saccharin
- Bitrex
- Irritant smoke (without a test enclosure)

If the individual can smell the test agent (or is irritated by the smoke), this indicates that the agent leaked into the facepiece and that the respirator has failed the test because a good facepiece-to-face seal has not been achieved. If the employee cannot successfully complete the qualitative test with a particular respirator, the employee must then be tested with another make, size, or brand of respirator.

Detailed protocols for qualitative fit testing are provided as part of the standard (see Appendix B of the standard in Appendix I of this document).



*Bitrex QLFT kit*

### ***What is a tight-fitting facepiece?***

A tight-fitting facepiece is intended to form a complete seal with the respirator wearer's face. This seal must be sufficiently tight to prevent any contaminants in the work environment from leaking around the edges of the facepiece into the user's breathing air.

In contrast, a loose-fitting facepiece is specifically designed to form a partial seal with the user's face. Such a facepiece typically covers at least the head and includes a system through which clean air is distributed into the breathing zone. For example, hoods, suits, and helmets are all loose-fitting facepieces. Such equipment does not rely on a tight facepiece-to-face seal to protect the worker, and is useful for workers with facial hair or other physical characteristics that make it difficult to wear a tight-fitting facepiece.

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*Tight-fitting facepiece*



*Loose-fitting hood*

### ***What are positive pressure and negative pressure respirators?***

Positive pressure respirators maintain positive air pressure inside the facepiece throughout the user's breathing cycle. That is, the air pressure inside the facepiece remains greater than the air pressure outside the facepiece. Thus, any leakage around the facepiece seal should result in air escaping from inside the facepiece to the outside environment rather than worksite contaminants leaking into the facepiece and breathing air.

In contrast, a negative pressure respirator will have a lower air pressure inside the facepiece than outside during inhalation. If the facepiece-to-face seal leaks on these types of respirators, air contaminants will be drawn into the breathing air.

### ***What is the fit factor?***

The fit factor is a quantitative measure of how well a particular respirator fits (or provides protection to) an individual. It is the ratio of the concentration of a contaminant in the environment to the concentration inside the mask.

Fit factors are obtained from quantitative fit testing. For example, if an employee was in a test chamber that contained 300 ppm of aerosol and 3 ppm of the test agent was found inside the mask, the fit factor would be equal to 100.

## ***(f)(1)* RESPIRATORS THAT REQUIRE FIT TESTING**

You must ensure that quantitative or qualitative fit testing is conducted for all employees required to wear either positive or negative pressure tight-fitting facepiece respirators. This

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includes both air-purifying and atmosphere-supplying respirators operating in either a positive or negative pressure mode, but does not include any loose-fitting facepieces.

### ***Must I perform fit testing for employees who voluntarily wear tight-fitting facepiece respirators ?***

No. If an employee chooses to wear a tight-fitting facepiece respirator (including a negative pressure air-purifying respirator or a filtering facepiece (dust mask)) in a worksite environment where such equipment is not necessary, you are not required to conduct fit testing.

### **(f)(2) WHEN FIT TESTING MUST BE CONDUCTED: GENERAL REQUIREMENTS**

You must ensure that fit testing is conducted for all employees required to wear tight-fitting facepiece respirators as follows:

- Prior to initial use.
- Whenever an employee switches to a different tight-fitting facepiece respirator (for example, a different size, make, model, or type).
- At least annually.

### **(f)(3) WHEN FIT TESTING MUST BE CONDUCTED: CHANGES IN THE RESPIRATOR WEARER'S PHYSICAL CONDITION**

You must ensure that an additional fit test is conducted if an employee experiences a change in physical condition that could affect the seal on the tight-fitting facepiece respirator. This requirement is triggered by a physical change:

- Reported by the respirator user.
- Observed by you, a physician or other licensed health care professional, the supervisor, or the program administrator.

Physical changes in the employee that might affect the facepiece-to-face seal could include, for example, an obvious change in body weight, facial scarring, extensive dental work, or cosmetic surgery.

**(f)(4) WHEN FIT TESTING MUST BE CONDUCTED: UNACCEPTABLE FIT AS DETERMINED BY AN EMPLOYEE AFTER FIT TESTING**

If, after fit testing, an employee reports that his or her respirator does not fit properly, you must allow the employee a reasonable opportunity to select a different tight-fitting facepiece respirator. After another respirator is selected, you must conduct a new fit test on the employee's replacement equipment.

An employee might determine that the facepiece does not establish an effective facepiece-to-face seal, for example, upon smelling a worksite contaminant while wearing the respirator with new cartridges. Or an employee might hear or feel air leaking around the facepiece-to-face seal. The employee's determination also can be based on factors unrelated to the particular worksite. For example, the employee might find that he or she can't wear the respirator for extended periods without experiencing irritation or pain.

**(f)(5) FIT TESTING PROCEDURES: GENERAL REQUIREMENTS**

You must ensure that all fit testing conducted for employees required to wear tight-fitting facepiece respirators follows the OSHA approved protocols.

Detailed protocols for qualitative and quantitative fit testing are provided as part of the standard (see Appendices A and B of the standard in Appendix I of this document). These protocols specify that you must have on hand during fit testing all types and sizes of respirators that are available for use at the worksite. This allows you to ensure that each employee is tested with the same type of respirator (make, model, style, and size) that he or she will wear at the worksite.

**(f)(6) LIMITATION ON USE OF QUALITATIVE FIT TESTING**

The table at the end of this chapter summarizes acceptable means of fit testing (QLFT versus QNFT) for different types of respirators. For more information, consult OSHA's web site at [www@OSHA.gov](http://www.OSHA.gov).

Qualitative fit-testing may be used to fit test all positive pressure respirators (air-supplying and PAPRs). Your use of qualitative fit testing on negative pressure air-purifying respirators is limited to those that must achieve a fit factor of 100 or less. Dividing the fit factor of 100 by a standard safety factor of 10 indicates that the negative pressure air-purifying respirators that have successfully completed a qualitative fit test can be relied on to reduce a worker's exposure by a protection factor of 10. The safety factor of 10 is used because protection factors that workers achieve at work sites tend to be much lower than the fit factors achieved during fit testing.



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In practice, this means that any negative pressure air-purifying respirator (APR) may be qualitatively fit tested if the APR is to be used in workplace atmospheres where the level of the hazardous contaminant is 10 times or less than the permissible exposure limit (PEL) and lower than the level that is immediately dangerous to life or health (IDLH). For example, if the PEL for a specific workplace contaminant is 5 ppm, you could use a qualitative fit test to fit test a negative pressure APR to be used in the workplace at exposure levels up to 50 ppm (ten times the PEL or less). If the workplace exposure level is greater than 50 ppm, however, you must use quantitative fit testing.

Both half-facepiece APRs and full-facepiece APRs may be qualitatively fit tested if they are to be worn in work areas where the concentration of contaminant is no more than ten times the PEL.

### *What is a PEL?*

OSHA PELs (permissible exposure limits) establish the maximum level of a specific contaminant that a worker can be exposed to, averaged over an 8-hour work day (8-hour time-weighted average, or TWA) or over a specified portion of a work day (for example, a 15 minute short-term exposure limit, or STEL). (PELs are listed in 29 CFR 1910.1000, and 1926.55. Also see the substance-specific standards for general industry and construction.)

## **(f)(7) USE OF QUANTITATIVE FIT TESTING**

If quantitative testing is used to fit test a tight-fitting facepiece respirator, respirator fit is not acceptable unless:

- For a half or quarter facepiece: The fit factor achieved in the test is greater than or equal to 100
- For a full facepiece: The fit factor achieved in the test is greater than or equal to 500

## **(f)(8) FIT TESTING FOR ATMOSPHERE-SUPPLYING AND POWERED AIR-PURIFYING RESPIRATORS**

You must ensure that all fit testing conducted for employees issued tight-fitting atmosphere-supplying respirators and powered air-purifying respirators is conducted in the negative pressure mode, even if the respirator is to be worn with positive pressure.

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This is because it is difficult outside of a laboratory test situation to accurately perform fit testing on positive pressure respirators.

***In what circumstances might an atmosphere-supplying or powered air-purifying respirator perform like a negative pressure respirator?***

For example, if the blower component of a powered air-purifying respirator loses power because it is turned off or the batteries run out, the respirator will become a negative pressure respirator. Similarly, atmosphere-supplying respirators can shift momentarily to negative pressure respirators if the air supply is restricted or the system fails.

Also, powered air-purifying respirators and self-contained breathing apparatus units can perform like negative pressure respirators as the user increases his or her inhalation rate during heavy work. The increased inhalation rate can result in negative pressure spikes inside the facepiece that are greater than the positive pressure of the air being supplied. This is called overbreathing the respirator. Therefore, positive air flow alone cannot be counted on to prevent the leakage that can occur with a poorly fitting facepiece.

You can conduct qualitative or quantitative fit testing of tight-fitting atmosphere-supplying respirators and powered air-purifying respirators according to the following requirements.

**Qualitative fit testing.** To conduct qualitative fit testing on an atmosphere-supplying respirator, you must do one of the following:

- Temporarily convert the user's actual facepiece into a negative pressure respirator by installing the appropriate filters. If you are not sure how to do this, check with the respirator manufacturer or your supplier.
- Use an identical negative pressure facepiece (size, make, model).

You can conduct qualitative fit testing on a powered air-purifying respirator by simply turning off the blower.

**Quantitative fit testing.** To conduct quantitative fit testing on an atmosphere-supplying respirator, you must temporarily or permanently install a sampling probe or adaptor inside the facepiece.

In preparation for testing, you should contact the respirator manufacturer or supplier for information on whether a sampling adapter can be temporarily installed in the facepiece. Any modifications made to a respirator for testing purposes must be removed before use.

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If temporary modifications cannot be made, you will need to permanently convert the facepiece to allow for testing. If you permanently convert the facepiece—for example, by drilling a hole in the respirator facepiece to insert the probe—you cannot repair the hole and put the respirator back in service. Once a hole is drilled in the facepiece, the respirator can only be used for fit testing purposes. It is no longer approved for workplace use.

**TABLE 2**

<b>Acceptable Fit-testing Methods</b>		
<b>Respirator</b>	<b>QLFT</b>	<b>QNFT</b>
Half-Face, Negative Pressure, APR (<100 fit factor)	Yes	Yes
Full-Face, Negative Pressure, APR (<100 fit factor) used in atmospheres up to 10 times the PEL	Yes	Yes
Full-Face, Negative Pressure, APR (>100 fit factor)	No	Yes
PAPR	Yes	Yes
Supplied-Air Respirators (SAR), or SCBA used in Negative Pressure (Demand Mode) (>100 fit factor)	No	Yes
Supplied-Air Respirators (SAR), or SCBA used in Positive Pressure (Pressure Demand Mode)	Yes	Yes
SCBA - Structural Fire Fighting, Positive Pressure	Yes	Yes
SCBA/SAR - IDLH, Positive Pressure	Yes	Yes
Mouthbit Respirators	Fit-testing Not Required	
Loose-fitting Respirators (e.g., hoods, helmets)		

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### **CHECKLIST FOR FIT TESTING**

Check that at your facility:

- Employees who are using tight fitting respirator facepieces have passed an appropriate fit test prior to being required to use a respirator.
- Fit testing is conducted with the same make, model, and size that the employee will be expected to use at the worksite.
- Fit tests are conducted annually and when different respirator facepieces are to be used.
- Provisions are made to conduct additional fit tests in the event of physical changes in the employee that may affect respirator fit.
- Employees are given the opportunity to select a different respirator facepiece, and be retested, if their respirator fit is unacceptable to them.
- Fit tests are administered using OSHA-accepted QNFT or QLFT protocols.
- QLFT is only used to fit test either PAPRs, SCBAs, or negative pressure APRs that must achieve a fit factor of 100 or less.
- QNFT is used in all situations where a negative pressure respirator is intended to protect workers from contaminant concentrations greater than 10 times the PEL.
- When QNFT is used to fit negative pressure respirators, a minimum fit factor of 100 is achieved for tight-fitting half-facepieces and 500 for full-facepieces.

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### **CHECKLIST FOR FIT TESTING (cont.)**

- For tight-fitting atmosphere-supplying respirators and powered air-purifying respirators:
  - Fit tests are conducted in the negative pressure mode.
  - QLFT is achieved by temporarily converting the facepiece into a negative pressure respirator with appropriate filters, or by using an identical negative pressure APR
  - QNFT is achieved by modifying the facepiece to allow for sampling inside the mask midway between the nose and mouth. The facepiece is restored to its NIOSH approved configuration before being used in the workplace.

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### **Section (g): USE OF RESPIRATORS**

As part of your written program, you must establish and implement procedures for the proper use of respirators in both routine jobs and emergencies. Specific use procedures are required to:

- Prevent leaks in the respirator facepiece seal.
- Prevent employees from removing respirators in hazardous environments.
- Ensure that respirators operate effectively throughout the work shift.
- Protect employees entering IDLH atmospheres and interior structural firefighting situations.

#### **(g)(1) PREVENTING LEAKS IN THE FACEPIECE SEAL**

Facepiece seals and valves are important in tight-fitting respirators. Tight-fitting respirators have a complete seal to the face. If there is a leak in the seal of a tight-fitting respirator or valve, then the respirator cannot reduce the wearer's exposures to respiratory hazards. You must be sure that nothing interferes with the seal of the respirator to the worker's face or with the valves.

Conditions that can interfere with the seal or valve are specified in the standard and include:

- Facial hair,
- Facial scars,
- Jewelry or headgear that projects under the facepiece seal,
- Missing dentures, and
- Corrective glasses or goggles or other personal protective equipment:
  - Face shields
  - Protective clothing
  - Helmets
  - Eyeglass insert or spectacle kits

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Workers may use this equipment with tight-fitting respirators if you ensure that the equipment is worn in a way that:

- Does not interfere with the face-to-facepiece seal.
- Does not distort the worker's vision.
- Does not cause physical harm to the worker (e.g., if the eyeglass insert did not fit properly so that the tight fit of the respirator caused the insert to press against his or her forehead, eyes, or temples).

You must make sure that the respirator does not interfere with the worker's eyewear or force the worker to remove the eyewear altogether.

### ***What if a worker has a condition that does not interfere with the face-to-facepiece seal?***

As long as the condition does not interfere with the function of the respirator valves, then the worker can wear a tight-fitting respirator, provided that the worker has no other conditions that interfere with the face-to-facepiece seal or valve. For example, a mustache may not interfere with the facepiece seal but may interfere with the valve function.

### ***Do these restrictions apply to all types of respirators?***

The restrictions for facial hair and other conditions apply ONLY to tight-fitting respirators. Several respiratory protection alternatives, such as loose-fitting hoods or helmets, are available to accommodate workers with facial hair or with other conditions that might interfere with the seal of the facepiece to the face of the user.

### ***Can employees wear contact lenses?***

Contact lenses can be safely worn with respirators.

You must be sure that workers perform user seal checks each time they put on a tight-fitting respirator. User seal checks are a quick and easy way for workers to verify that they have put on their respirators correctly and that the respirators are working properly.

To conduct a user seal check, the worker must follow either the procedures for a user seal check that are contained in Appendix B-1 of the Respiratory Protection standard or equally effective procedures that the respirator manufacturer recommends for conducting a user seal check.

***How are user seal checks conducted?***

To conduct a user seal check, the worker performs a negative **or** positive pressure fit check.

- For the negative pressure check, the worker:
  - covers the respirator inlets (cartridges, canisters, or seals)
  - gently inhales, and
  - holds breath for 10 seconds.The facepiece should collapse on the worker's face and remain collapsed.

- For the positive pressure check, the worker:
  - covers the respirator exhalation valve(s); and
  - exhales.The facepiece should hold the positive pressure for a few seconds. During this time, the worker should not hear or feel the air leaking out of the face-to-facepiece seal.

Appendix B-1 of the Respiratory Protection standard provides detailed instructions on how to conduct the user seal check.

The manufacturer's recommended procedures for checking the facepiece seal may be used if the employer demonstrates that the manufacturer's procedures are as effective as those described in Appendix B-1 of the Respiratory Protection standard, e.g., these procedures are effective in identifying respirators that fit poorly when put on or adjusted.

***Can a user seal check be used as a substitute for a qualitative fit test?***

A user seal check is **not** a substitute for a qualitative fit test. Fit testing is a more rigorous procedure that is used to determine whether the respirator fits the face of the worker. Section (f) of this Compliance Guide contains a complete discussion on respirator fit testing.



***How can employers ensure that workers perform user seal checks?***

The intent of the standard is that you make sure that the fit and performance of the respirator is not compromised. You must take actions that will result in safe work practices. Examples of these actions include:

- Providing training to workers
- Routinely observing work practices
- Routinely monitoring site conditions
- Consulting employees

**(g)(2) CONTINUING RESPIRATOR EFFECTIVENESS**

You must be aware of conditions in work areas where employees are using respirators. You must also allow employees to leave the respirator use area to perform any activity that involves removing or adjusting a respirator facepiece, or if there is any indication that a respirator may not be fully effective. If there is any indication that they are not functioning properly, you must replace, repair, or discard respirators, before allowing employees to return to an area in which respirator use is required.

***How can I conduct appropriate surveillance?***

“Appropriate surveillance” means that you must routinely look for any changes that may affect the effectiveness of a respirator. You must look for changes in the work area, such as changes in work tasks or processes, that can result in changes in the hazard or the time period of exposure, or that put the employee in closer proximity to the hazard. Another change might be the addition of new machinery that would cause an employee to exert more energy and breathe harder.

By “appropriate surveillance” OSHA means that you must routinely observe employees as they work while wearing respirators. By observing respirator use under actual workplace conditions, you can determine:

- Whether other protective equipment is interfering with respirator use.
- Whether a change in working conditions may result in exposure to new contaminants.

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- Whether workers are experiencing discomfort, such as skin irritation or breakthrough of contaminants through cartridges and canisters.

If any of these conditions exist, you must make adjustments—such as providing a more protective respirator or a different size or style of respirator, or altering work practices to reduce the stress on workers—to ensure that workers continue to receive adequate respiratory protection.

### ***When must I allow workers to leave the respirator use area?***

To maintain their respirators, workers may, from time to time, need to leave the area where respirator use is required and go to a safe area free of respiratory hazards and contaminants.

Workers must leave the respirator use area:

- If the worker needs to wash his or her face or the respirator facepiece to prevent eye or skin irritation associated with respirator use.
- If the worker detects vapor or gas breakthrough (that is, the cartridge or canister is saturated with contaminant and needs to be changed).
- If the worker notices that the facepiece is leaking.
- If the worker observes a change in breathing resistance (that is, the filter is full of dust or other particles and needs to be changed).
- If the respirator or parts of the respirator, such as valves or straps, are not working properly and need to be replaced.

Workers need a “safe area” in the workplace where they can safely remove their respirators to wash or conduct the maintenance necessary to ensure the respirator’s adequate operation.

### ***Where does the safe area need to be located?***

The safe area must be located in a place that is free of respiratory hazards or contamination. As long as these conditions are met, the safe area can be in a location that minimizes interruptions to work flow.

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### ***When must I replace or repair respirators?***

You must replace or repair respirators that are not working properly. Respirators should not be used if they are defective in any way. You must replace or repair a defective respirator whenever the worker detects vapor or gas breakthrough, changes in breathing resistance, or facepiece leakage, before allowing the worker to return to the work area where respirator use is required.

### ***How often do respirators need to be replaced or repaired?***

There is no required replacement schedule for respirators in general. However, damaged respirators cannot properly protect employees. Respirators need to be replaced or repaired when one or more of their components is missing, damaged, or visibly deteriorated.

## **(g)(3) PROCEDURES FOR IMMEDIATELY DANGEROUS TO LIFE OR HEALTH ATMOSPHERES (IDLH) AND FOR INTERIOR STRUCTURAL FIREFIGHTING**

This section of the Respiratory Protection standard contains requirements for respirator use in IDLH environments. The standard defines IDLH as “an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual’s ability to escape from a dangerous atmosphere.” Section d of this Compliance Guide (Selection of Respirators) contains additional information about IDLH environments.

The provisions of paragraph (g)(3) of the Respiratory Protection standard are requirements for respirator use in all IDLH atmospheres. Paragraph (g)(4) contains additional requirements applicable only to the extra-hazardous environments encountered during interior structural fire fighting (two-in/two-out; use SCBAs only). OSHA considers interior structural firefighting environments to be IDLH environments. These two paragraphs ((g)(3) and (g)(4)) deal with requirements for standby personnel and the respirator users inside the IDLH atmosphere. The standard requires standby personnel when workers use respirators in IDLH environments. These two provisions are intended to ensure that adequate rescue capability exists in case of respirator failure or some other emergency inside the IDLH environment.

### ***Who are standby persons?***

Standby personnel remain outside the IDLH atmosphere. They must be available, trained, and equipped to assist respirator users inside the IDLH atmosphere, and to provide effective emergency rescue, when needed.

You must be sure that standby personnel maintain visual, voice, or signal line communication with the workers in the IDLH environment. Standby personnel may use radios to communicate with workers inside the IDLH environment. You must be sure that standby personnel notify you

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or your designated representative before entering the IDLH atmosphere. Once notified, you must provide necessary assistance appropriate to the situation.

### ***When do I need to have more than one standby person located outside the IDLH environment?***

A single standby person is adequate if an IDLH environment is well-characterized and controlled and if one person can easily maintain communication with all workers in the IDLH environment. Two stand-by personnel are required for interior structural firefighting. An IDLH atmosphere is “well-characterized” if it has been monitored and the results of the monitoring have been analyzed, or if it has been through a process hazard analysis. (Chemical plants conduct comprehensive process hazard analyses as required by OSHA’s Process Safety Management standard [29 CFR 1910.119] to determine which process units pose IDLH hazards.)

Often, only one respirator user at a time is exposed to an IDLH atmosphere, and a single standby person can easily monitor that worker’s status. Even in situations where more than one respirator user is inside an IDLH environment, a single standby person can often provide adequate communication and support. For example, one standby person can easily communicate with more than one employee working inside a small pump room or shed.

More than one standby person may be required for other situations. For example, to clean and paint the inside of a multi-level, multi-portal water tower, a process that often generates a deadly atmosphere as a result of cleaning solution and paint solvent vapors, employees often enter the tower through different portals to work on different levels. In such a situation, there will be a need for good communication at each entry portal, and more than one standby person would be needed to maintain adequate communication and accessibility (See also 29 CFR 1910.146, Confined Spaces).

For interior structural firefighting, you must have two employees enter the IDLH atmosphere and remain in visual or voice contact with one another at all times. You must also have two standby personnel located outside the IDLH atmosphere; all employees engaged in interior structural fire fighting must use SCBAs.

### ***When must standby personnel maintain communication with workers in the IDLH atmosphere?***

At all times. Voice and visual or hand signal line communication must be maintained between the employee(s) in the IDLH environment and the standby person. Because IDLH conditions present the potential for serious injury or death, there is little margin for error in an IDLH environment. Equipment malfunction in an IDLH environment can

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swiftly disable workers, prevent them from leaving the environment, and lead to severe injury or death. For this reason, close communication between standby personnel and respirator users in the IDLH environment is critical.

### *When is radio communication acceptable?*

Standby personnel may communicate by radio with workers inside the IDLH environment. Although workers inside the IDLH atmosphere may also communicate by radio, these workers must remain in visual contact.

### *Is voice communication the only acceptable method for workers in the IDLH environment and standby personnel to communicate with one another?*

No. Communication can be in the form of hand signals if the workers in the IDLH atmosphere and the standby personnel remain in view of one another. Signal lines may also be used. It is also advisable to have several means of communication systems on hand, in the event that one form of communication fails.

### *What is appropriate training and equipment for the standby personnel?*

You must train the standby personnel to:

- Provide effective emergency rescue; **and**
- Notify you or your designated representative before the standby personnel enter the IDLH atmosphere to provide emergency rescue.

You must equip your standby personnel with the following:

- Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; **and**
- Either appropriate retrieval equipment for removing the workers inside the IDLH atmosphere where retrieval equipment would contribute to the rescue of the workers inside the IDLH atmosphere and would not increase the overall risk resulting from entry; **or**
- Equivalent means for rescue where retrieval equipment could increase the overall risk resulting from entry.

For workers involved in interior structural firefighting, standby personnel must be equipped with SCBAs.

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Rescue personnel must be properly trained and protected before they enter the IDLH environment. The Hazardous Waste Operations and Emergency Response standard (29 CFR 1910.120) and the Permit-Required Confined Spaces standard (29 CFR 1910.146) provide guidance on the training and protective equipment that is required. Situations exist in which retrieval lines (harnesses, wristlets, anklets) may pose an entanglement problem, especially in areas in which air lines or electrical cords are present in the work areas in which the IDLH atmosphere occurs. Most of the time, however, rescue with retrieval equipment is effective, and much safer for the rescuers, because the standby personnel do not have to enter the IDLH atmosphere.

### ***If there is an emergency can the standby provide immediate rescue assistance?***

Your standby personnel must inform either you or your designated representative before attempting emergency rescue within an IDLH environment. Your designated representative may be a properly trained employee or response team or local firefighting and emergency rescue personnel. In any case, proper arrangements and procedures must be in place before you can allow your workers to enter an IDLH environment. Once notified, you must provide necessary assistance appropriate to the situation.

This provision of the standard is intended to ensure that you know when an emergency has occurred so that you or your designated representative can send in immediate additional assistance to help in the rescue.

### ***When should standby personnel enter the IDLH environment?***

Under most circumstances, standby personnel should not enter the IDLH environment until you or your designated representative has responded to the notification acknowledging that an emergency exists, that rescue personnel are entering the IDLH environment, and that emergency response units are on their way to provide additional assistance. You must provide standby personnel (rescuers) with proper respiratory equipment, and you must train and prepare your standby personnel to facilitate rescue attempts.

This notification provision is not intended to suggest that standby employees should wait indefinitely for you or your authorized designee to respond to notification before entering the IDLH atmosphere when your workers inside are in danger and standby personnel are appropriately trained and equipped to provide assistance. In the majority of cases, however, rescuers should not enter the IDLH environment until receiving some response from you ( i.e., you or your designated representative should know that the rescuers are entering and emergency response units should be on their way to the incident).

### ***How must I provide appropriate assistance in emergencies?***

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Once you or your designated representative has been notified, you or your representative must provide the necessary assistance appropriate for the situation. You must make sure that:

- Rescue operations are carried out appropriately
- Rescuers are provided with proper respiratory equipment
- Designated employees are adequately prepared to conduct rescue attempts

You may not always need to send standby personnel into the hazardous atmosphere. In some cases, the worker within the IDLH environment will be able to get out on his or her own, or retrieval equipment may enable rescuers to retrieve the worker without entering the hazardous atmosphere. In these instances, you will need to provide workers inside IDLH atmospheres and standby personnel employees with emergency medical treatment. If standby employees do need to enter the hazardous environment to perform rescue operations, however, you must make sure that those rescuers are fully protected.

You should consult OSHA's rules on confined spaces (29 CFR 1910.146) and on hazardous waste operations and emergency response (29 CFR 1910.120) for other provisions that may apply to IDLH environments.

### **(g)(4) PROCEDURES FOR INTERIOR STRUCTURAL FIREFIGHTING**

This portion of the standard applies to workers engaged in interior structural firefighting only.

#### ***What is interior structural firefighting?***

Firefighting to control or extinguish a fire in an advanced stage of burning inside a building. Because the fire is producing large amounts of smoke, heat, and toxic products of combustion, exposure to firefighters is extremely hazardous and the environment is considered IDLH.

#### ***Are all firefighters engaged in interior structural firefighting covered by the standard?***

The Respiratory Protection standard applies directly to private sector workers engaged in firefighting, including those working in industrial fire brigades and private incorporated fire companies, and to federal employees covered under Section 19 of the Occupational Safety and Health Act.

Federal OSHA's jurisdiction does not extend to employees of state and local governments; therefore, public sector firefighters are covered only in the 25 states which

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operate their own OSHA-approved occupational safety and health state programs and are required to extend the provisions of their state standards to these workers. These states and territories are: Alaska, Arizona, California, Connecticut, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, New York, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Virgin Islands, Washington, and Wyoming.

Coverage of volunteers varies by state and depends on state law. State and local government employees in states that do not operate OSHA-approved state plans are not covered by these requirements, unless the requirements are voluntarily adopted for local applicability.

### ***What additional requirements apply to interior structural firefighting?***

In addition to the requirements for all IDLH atmospheres, if your workers are involved in interior structural firefighting, you must be certain that:

- At least two employees enter the IDLH atmosphere and remain in visual or voice contact with one another at all times.
- At least two employees are located outside the IDLH atmosphere.
- All employees engaged in interior structural firefighting use SCBAs.

Although two individuals must always be located outside the IDLH atmosphere, one may be assigned to an additional role, such as incident command, pump operations, or operator of the fire apparatus—so long as this individual is able to perform assistance or rescue activities without jeopardizing the safety or health of any firefighter working at the incident. Any assignment of additional duties to the second firefighter must be weighed against the potential for the additional duties to interfere with assistance or rescue activities.

### ***Must firefighters wait until four workers are assembled before attempting to rescue victims inside the burning structure?***

No. There is an explicit exemption in the Respiratory Protection standard that states that, if life is in jeopardy, the “two-in, two-out” requirement is waived. The incident commander and the firefighters at the scene must decide whether the risks posed by entering the interior structural fire before at least four firefighters have assembled is outweighed by the need to rescue a victim whose life may be at risk.



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### **CHECKLIST FOR PROPER USE OF RESPIRATORS**

Check your facility to be certain that:

- Workers using tight-fitting respirators have no conditions, such as facial hair, that would interfere with a face-to-facepiece seal or valve function.
- Workers wear corrective glasses, goggles, or other protective equipment in a manner that does not interfere with the face-to-facepiece seal or valve function.
- Workers perform user seal checks prior to each use of a tight-fitting respirator.
- There are procedures for conducting ongoing surveillance of the work area for conditions that affect respirator effectiveness, and that, when such conditions exist, you take steps to address those situations.
- Employees are permitted to leave their work area to conduct respirator maintenance, such as washing the facepiece, or to replace respirator parts.
- Employees do not return to their work area until their respirator has been repaired or replaced in the event of breakthrough, a leak in the facepiece, or a change in breathing resistance.
- There are procedures for respirator use in IDLH atmospheres and during interior structural firefighting to ensure that: the appropriate number of standby personnel are deployed; standby personnel and employees in the IDLH environment maintain communication; standby personnel are properly trained, equipped, and prepared; you will be notified when standby personnel enter an IDLH atmosphere; and you will respond to this notification.
- Standby personnel are equipped with a pressure demand or other positive pressure SCBA, or a positive pressure supplied air respirator with an escape SCBA, and appropriate retrieval equipment or other means for rescue.
- Procedures for interior structural firefighting require that: at least two employees enter the IDLH atmosphere and remain in contact with one another at all times; at least two standby personnel are used; and all firefighting employees use SCBAs.

## **Section (h): MAINTENANCE AND CARE OF RESPIRATORS**

You must provide respirator users with equipment that is clean, sanitary, and in good working order. To accomplish this you must have a system of respirator care and maintenance as a component of your respiratory protection program. Regular care and maintenance is important to ensure that the equipment functions as designed and protects the user from the threat of illness or death.

Your system of respirator care and maintenance must provide for:

- cleaning and disinfection procedures
- proper storage
- regular inspections
- repair methods

### **(h)(1) CLEANING AND DISINFECTING**

Respirator equipment must be regularly cleaned and disinfected according to specified procedures (see Appendix B-2 of the standard in Appendix I of this document) or according to manufacturer specifications that are of equivalent effectiveness.

Cleaning and disinfection procedures are divided into the following:

- Disassembly of components
- Cleaning and disinfecting
- Rinsing, drying, and reassembly
- Testing

#### ***How often must respirators be cleaned and disinfected?***

The frequency of cleaning and disinfecting or sanitizing respirators will depend in part on whether your employees share the equipment or are issued respirators for their exclusive use. Worksite conditions also will dictate cleaning frequency, e.g., working in a dirty

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environment will require that the respirator facepiece, in particular, be cleaned more frequently.



*Respirator wipes are useful for cleaning*

At a minimum:

<b>If a respirator is...</b>	<b>Then...</b>
issued for the exclusive use of an individual employee	the equipment must be cleaned and disinfected as often as necessary to be maintained in clean and sanitary condition.
used by more than one employee	the equipment must be cleaned and disinfected <i>before</i> being used by different individuals.
maintained for use in emergencies, testing, and training exercises	the equipment must be cleaned and disinfected <i>after</i> each use.

### ***Who is responsible for cleaning and disinfecting respirators?***

You may choose the program that best meets the needs of your workplace. For example, you may use a centralized operation where employees receive respirators that have been cleaned, disinfected and repaired by workers assigned to this task. You also may require that each respirator wearer be responsible for cleaning and maintaining his or her equipment. In either case, you must provide appropriate training, on-the-job-time, and the necessary equipment and supplies.

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In addition, if individual employees are required to clean their own respirators, you must allow time during work hours for users to perform this function.

### *h(2)* STORAGE

#### *What are the proper storage procedures for respirators?*

You must store respirators in a manner that:

- Protects them from contamination, dust, sunlight, extreme temperatures, excessive moisture, damaging chemicals, or other destructive conditions.
- Prevents the facepiece or valves from becoming deformed.
- Follows all storage precautions issued by the respirator manufacturer.

In addition, if a respirator is intended for emergency use, it must be:

- Kept accessible to the work area, but not in an area that may itself become involved in an emergency and become contaminated or inaccessible.
- Stored in a compartment or cover (e.g., on a fire truck) that is clearly identified as containing emergency equipment.

### *h(3)* INSPECTION

#### *How often must respirators be inspected, and what procedures do I follow?*

The frequency of and procedures for inspections depend on whether the respirator is intended for non-emergency, emergency, or escape-only use.

All respirator inspections must include:

- A check of respirator function, i.e., visual inspection to identify any parts that may be missing, distorted, blocked, loose, deteriorated, or otherwise interfere with proper performance.
- A check of elastomeric (rubber) parts for pliability and deterioration.

In addition, inspect:

- **Non-emergency use equipment.** *Before* each use and *during* cleaning and disinfection.

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- **Self-contained breathing apparatus (SCBA).** *Monthly*, making sure the air and oxygen cylinders that are available for immediate use are maintained in a fully charged state (i.e., pressure is not below 90% of manufacturer's recommended level). You must also activate the regulator and low pressure warning devices to ensure that they function properly.
- **Emergency use respirators.** *At least monthly*, checking for proper functioning *before and after each use*. When inspecting these types of respirators you must:
  1. Document the date of inspection, name or signature of inspector, inspection findings, any remedial action required, and serial number or other identification of the respirator.
  2. Retain this information with the respirator, storage compartment, or inspection report until next certification. You may use tags to document the inspections.
- **Emergency escape-only equipment.** *Before* being carried into the workplace for use.



*Inspection of SCBA nosecup*

### ***h(4)* REPAIRS**

#### ***What do I do if a respirator fails to pass inspection?***

If a respirator does not pass inspection, you must remove the respirator from service and discard, repair, or adjust it. Tagging out of service respirators is a good means for ensuring that defective respirators are not inadvertently used.

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### ***Who performs the repair work?***

Respirators may be repaired only by an appropriately trained person, who must use NIOSH-approved parts that are designed for the particular respirator being repaired.

Valves, regulators, and alarms must be adjusted and repaired only by the manufacturer or a technician trained by the manufacturer.

### ***What are some examples of when a respirator should be removed from service?***

- A cartridge has become saturated or a contaminant has broken through the cartridge and must be replaced.
- An alarm system is not functioning on an SCBA.
- A respirator strap, buckle, or connection is damaged or missing.
- The mask portion of a respirator is misshapen or degraded and can no longer form a good seal around the user's face.

## Small Entity Compliance Guide

### **CHECKLIST FOR RESPIRATOR MAINTENANCE AND CARE**

Check to make sure that your facility has met the following requirements:

#### ***Cleaning and Disinfecting***

- Respirators are provided that are clean, sanitary, and in good working order.
- Respirators are cleaned and disinfected using the procedures specified in Appendix B-2 of the standard.
- Respirators are cleaned and disinfected:
  - As often as necessary when issued for the exclusive use of one employee.
  - Before being worn by different individuals.
  - After each use for emergency use respirators.
  - After each use for respirators used for fit testing and training.

#### ***Storage***

- Respirators are stored to protect them from damage from the elements, and from becoming deformed.
- Emergency respirators are stored:
  - To be accessible to the work area.
  - In compartments marked as such.
  - In accordance with manufacturer's recommendations.

#### ***Inspections***

- Routine-use respirators are inspected before each use and during cleaning.
- SCBAs and emergency respirators are inspected monthly and checked for proper function before and after each use.
- Emergency escape-only respirators are inspected before being carried into the workplace for use.

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### **CHECKLIST FOR RESPIRATOR MAINTENANCE AND CARE (cont.)**

- Inspections include:
  - Check of respirator function
  - Tightness of connections
  - Condition of the facepiece, head straps, valves, and cartridges.
  - Condition of elastomeric parts.
- For SCBAs, inspection includes checking that cylinders are fully charged, and that regulators and warning devices function properly.
- Emergency use respirators are certified by documenting the inspection, and by tagging the information either to the respirator or its compartment, or storing it with inspection reports.

#### ***Repairs***

- Respirators that have failed inspection are taken out of service .
- Repairs are made only by trained personnel.
- Only NIOSH-approved parts are used.
- Reducing and admission valves, regulators and alarms are adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.



## **Section (i): BREATHING AIR QUALITY AND USE**

This section of the Respiratory Protection standard requires you to provide workers who are wearing atmosphere-supplying respirators with breathing air of high purity. Respirators that supply breathing air are generally used in highly hazardous work environments. It is critical that such respirator systems provide breathing air of optimal quality and that the equipment operates reliably.

More broadly, you are required to establish or continue a respiratory protection program that follows performance standards for the operation and maintenance of breathing air compressors, methods for ensuring breathing air quality, and requirements for the quality of purchased breathing air.

The requirements detailed in this section are critical for ensuring the integrity of high purity breathing air for use with respirators, whether the air is delivered in tanks by a supplier or produced on site using a compressor. Also, it is your responsibility to ensure that practices are in place for protecting the quality of breathing air while stored in containers and when being used by employees. These requirements are essential for protecting respirator-wearing workers from the threat of illness or death.

As detailed below, when using atmosphere-supplying respirators you must:

- Provide breathing air that meets certain specifications.
- Develop procedures to ensure the proper use of compressed gas cylinders and air compressors.
- Implement certain precautions to avoid improper use of couplings on airline systems and confusion about breathing air containers.
- Implement certain precautions to prevent exposure to carbon monoxide when using air compressors.

## ATMOSPHERE-SUPPLYING RESPIRATORS

Atmosphere-supplying respirators are used to provide breathing air from a source independent of the ambient atmosphere. The two types of such equipment are:

- Self-contained breathing apparatus (SCBA) units, for which air is supplied from a tank (a cylinder of compressed air or oxygen). For this type of respirator, the source of the breathing air is designed to be transported by or with the equipment user.
- Supplied-air respirators (SARs) (also known as airline respirators), which receive air from a connecting hose. The source of air is either a pressurized cylinder or an air compressor. Because the employee does not carry the air on his or her back when using a SAR, breathing air can be provided over a longer time than is the case with a SCBA.

### *How is breathing air delivered to the respirator user?*

Air compressors capture air from the surrounding environment, filter it, remove oil (if necessary), compress it to increase its density, and deliver the air through a system of regulators that brings the air back down to a breathable pressure for the respirator user.

With SCBA units, the pressurized breathing air is transferred from the tank to the respirator user through regulators that decrease the pressure to a level that a human can breathe. Because there is a fixed amount of air in the tank, the user can only rely on it for a given period of time. That time varies based on the size of the tank, the amount of pressure in the tank, and the physical effort required by the respirator user. Use times range from 20 minutes for low pressure tanks (2,500 psi) to 45 minutes for high pressure tanks (4,500 psi).

The air delivered by both types of system is at slightly greater than atmospheric pressure, which assists in preventing contaminated air from seeping through gaps in the facepiece or other areas.

### **(i)(1) SPECIFICATIONS FOR BREATHING AIR**

You must ensure that compressed air, compressed oxygen, liquid air, and liquid oxygen meet certain specifications as outlined below for breathing by employees wearing atmosphere-supplying respirators. Unless you produce your own breathing air from a compressor, you can rely on certificates of analysis from air suppliers to ensure that breathing air meets the required

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specifications.

### Types of Breathing Air

Compressed air is the most common type of breathing air system used in worksite applications because it is the most convenient and least expensive. Compressed air is provided either through compressed air cylinders or air compressors at relatively high pressures. Regulators are used to ensure that breathing air supplied to respirators is provided at pressures that are safe for workers to breathe.

Other types of breathing air systems include liquid air, compressed oxygen, and liquid oxygen. Liquid air is air that exists in a liquid state, which is achieved by compressing purified air and chilling it to a temperature below the boiling point of its principal components (i.e., nitrogen and oxygen). Compressed oxygen systems are used in limited applications because they present a significant fire hazard. Liquid oxygen is quite expensive and also presents a significant fire hazard. It is generally used only in very specialized applications.

### Specifications

- (i)(I)(i) Compressed and liquid oxygen.** Such forms of oxygen must meet the U.S. Pharmacopoeia requirements for medical or breathing oxygen.
- (i)(I)(ii) Compressed breathing air.** Any compressed breathing air must meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air (G-7.1-1989). This specification requires that:

  - (A)** ■ Oxygen content in compressed breathing air must be 19.5 to 23.5 percent of the total volume of air.
  - (B)** ■ Condensed hydrocarbon content in compressed breathing air must be 5 milligrams (mg) per each cubic meter (m<sup>3</sup>) of air or less.
  - (C)** ■ Carbon monoxide content in compressed breathing air must be 10 parts per million (ppm) or less.
  - (D)** ■ Carbon dioxide content in compressed breathing air must be 1,000 ppm or less.
  - (E)** ■ There must be a lack of any noticeable odor from the compressed breathing air.

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### *(i)(2)&(3)* OXYGEN USE

**Explosion/fire hazard from compressor oil and grease.** You must prohibit employees from using compressed oxygen in respirators that have previously been used with compressed air. The reason for this prohibition is that oil and grease can be introduced into respirator airlines used for compressed air, posing a danger of fire or explosion from the high pressure oxygen coming in contact with the oil or grease. Airline systems contain inline filters for capturing impurities so that the respirator user will not inhale the oil or grease.

**Explosion/fire hazard from high concentration oxygen.** You must ensure that employees use oxygen concentrations greater than 23.5 percent only with equipment designed specifically for oxygen service and distribution. Such equipment is specifically designed to minimize the risk of fire or explosion posed by the high concentration of oxygen.

### *(i)(4)* CYLINDER USE

You must ensure that cylinders used with atmosphere-supplying respirators meet the following requirements:

- Cylinders of breathing air must be tested and maintained according to Department of Transportation (DOT) Shipping Container Specification Regulations (49 CFR Parts 173 and 178), which include provisions for the construction, testing, and maintenance of cylinders. These steps are necessary to prevent explosions that can result from a rupture in a breathing air cylinder under high pressure. (Additional guidance is available in OSHA 29 CFR 1910.101(b), which includes provisions for in-plant handling and storage of compressed gas cylinders.)
- Cylinders of purchased breathing air must be accompanied by a certificate from the supplier indicating that the contents of each cylinder have been tested and found to meet the criteria for Grade D breathing air. This certification will provide you with a reasonable assurance that the breathing air supplied to your employees is safe.
- Cylinder contents must have a moisture level that does not exceed a dew point of minus 50°Fahrenheit (F) (minus 45.6°Celsius [C]) at 1 atmosphere pressure. (Dew point refers to the temperature at which the air is saturated with moisture.) This requirement is intended to prevent respirator valves from freezing when excess moisture accumulates on the valves, which can cause blockages in the flow of breathing air. You should verify with the supplier that the breathing air meets this requirement.

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### (i)(5)-(7) COMPRESSOR USE

#### General Requirements

You must ensure that compressors used with atmosphere-supplying respirators provide breathing air according to the following requirements:

(i)(5)(i) **Location of compressor during use.** The location of an air compressor during use is very important to maintain the purity of the supplied breathing air. For this reason, an air compressor in use must be located so that the air intake component is not drawing from areas that contain:

- Combustion exhaust from vehicles or the compressor itself.
- Plant process exhaust, which should be exhausted to the outside by the facility's ventilation system.
- Contaminated air from hazardous work areas.

(i)(5)(ii) **Low moisture content of ambient air.** The moisture content of compressed air must be kept to a minimum to prevent freezing of respirator valves at cold temperatures, which can cause blockages in the flow of breathing air. To ensure a low moisture content, the dew point at one atmosphere must be 10° F (5.56° C) below the ambient temperature (in plant).

***Are there any systems for keeping moisture from getting into a compressor?***

Water traps or desiccators can keep moisture out of a compressor. These systems remove the water from the air as it is run through the compressor, ensuring a certain level of dryness when it comes out. Such systems, like all other parts of a compressor, must be maintained in accordance with the manufacturer's instructions to properly remove the moisture.

(i)(5)(iii) **Inline air purification.** Suitable air-purifying beds and filters must be used in the supply lines to ensure delivery of a continuous flow of Grade D breathing air to the respirator user. (A sorbent bed is a filter designed to capture impurities in the air.) You must maintain, refurbish, or replace inline sorbent beds and filters as specified by the equipment manufacturer.

(i)(5)(iv) **Tracking of bed and filter changes.** You must ensure that a tag is maintained at/on the compressor with a note indicating when the sorbent beds and filters were last changed. The notation must include the signature of the person you have authorized to perform the bed and filter maintenance. Only a tag indicating the *most recent* filter and bed changes needs to be retained at/on the compressor.

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### Requirements Regarding Carbon Monoxide

You must take certain precautions in regard to carbon monoxide when using compressors with atmosphere-supplying respirators. These precautions are required because:

- Exposure to carbon monoxide above certain levels can be fatal.
- Sources of this potentially lethal gas are fairly common in many worksites. (In fact, one source of carbon monoxide is the exhaust from the compressor itself.)
- You will not be able to detect the presence of carbon monoxide because it is an odorless gas.

The types of precautions you will need to take depend on the type of compressor you use.

**(i)(6) Compressors that are not oil lubricated.** With this type of compressor, you must ensure that carbon monoxide in the breathing air is less than or equal to 10 ppm. This can be achieved by:

- Locating the compressor's air intake component in an area free of contaminants
- Conducting continuous or frequent monitoring of the breathing air supply
- Using inline carbon monoxide filters
- Using high-temperature alarms or shut-off devices

***Must each of these methods be used for compressors that are not oil lubricated?***

No. You must use whichever of the above methods are necessary to ensure that carbon monoxide does not contaminate the breathing air. In some cases, one method may be all that is needed. In other cases, you may be required to use more than one of these methods. You must evaluate your own worksite conditions to determine which measures are needed to prevent carbon monoxide from contaminating breathing air.

**(i)(7) Compressors that are oil lubricated.** With this type of compressor, carbon monoxide can be generated when oil enters the combustion chamber and is partially combusted. Therefore, you must ensure that the compressor operates with a carbon monoxide alarm or a high-temperature alarm.

Carbon monoxide alarms provide better protection than high-temperature alarms because the high-temperature alarms only detect carbon monoxide generated in the combustion chamber, and

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not carbon monoxide resulting from a poorly located compressor intake. Furthermore, high-temperature alarms are installed more for the purpose of protecting the compressor from damage than guarding employees from exposure to carbon monoxide. Because of this, the alarm component of the system is often located with the alarm sensor, where it may not be heard by the respirator users. Consequently, if the compressor has only a high-temperature alarm, you must ensure that air quality is frequently monitored to confirm that carbon monoxide levels stay below 10 ppm.

### ***How often should I check on carbon monoxide levels?***

Periodic monitoring for carbon monoxide is acceptable when using newer, well-maintained compressors. Continuous monitoring, however, is recommended for older compressors. In older equipment, oil may enter the air supply more readily due to piston ring or cylinder wear. Continuous monitoring also should be conducted for rented or second-hand compressors because the maintenance history is likely to be unknown or uncertain.

### ***How do I check carbon monoxide levels?***

Carbon monoxide levels can be tested with two general types of devices:

- Direct reading instruments that use electrochemical sensors
- Chemical detector tubes

Although the electrochemical devices tend to be more expensive, they are also more accurate (i.e., they have a 5 percent error rate). Also, such devices must be calibrated periodically (usually monthly) to achieve accurate readings. Chemical detector tubes have a higher error rate of 10 to 15 percent. Carbon monoxide filters (i.e., filters that convert carbon monoxide to carbon dioxide) with color-change indicators may not be used as carbon monoxide monitors because the color change indicates the presence of moisture, not carbon monoxide.

## **(i)(8) PRECAUTIONS REGARDING COUPLINGS**

You must ensure that couplings used on airlines for atmosphere-supplying respirators are *incompatible* with outlets for nonbreathable worksite air or other gas systems. This precaution

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must be taken to avoid the chance of inadvertently connecting a respirator to a source other than the breathing air. Such a mistake could result in serious illness or death.

Also, you must ensure that at no time is an asphyxiating substance introduced into a respirator's airlines. For example, an inert gas such as nitrogen must not be used to purge or clean breathing airlines.

### **(i)(9) LABELING OF BREATHING GAS CONTAINERS**

You must ensure that breathing air containers are labeled in keeping with the NIOSH respirator certification standard (42 CFR 84). The NIOSH standard incorporates ANSI's Method of Marking Portable Compressed Gas Containers to Identify Material Contained (Z48.1-1971). Proper labeling of containers will avoid the possibility of confusion when connecting the breathing air source to the respirator.



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### **CHECKLIST FOR BREATHING AIR QUALITY AND USE**

Check that at your facility:

#### ***General***

- Compressed breathing air meets the requirements for Grade D breathing air.
- Compressed oxygen is not used in respirators that have previously used compressed air.
- Oxygen concentrations greater than 23.5 percent are used only in equipment designed for oxygen service or distribution.
- Breathing air couplings are incompatible with outlets for other gas systems.
- Breathing gas containers are marked with appropriate NIOSH certification.

#### ***Breathing Air Cylinders***

- Cylinders are tested and maintained according to DOT 49 CFR Part 173 and 178.
- A certificate of analysis for breathing air has been obtained from the supplier.
- Moisture content in the cylinder does not exceed a dew point of -50° F at 1 atmosphere pressure.

**CHECKLIST FOR BREATHING AIR QUALITY AND USE (cont.)**

***Compressors***

- Are constructed and situated to prevent contaminated air from getting into the system.
- Are set up to minimize the moisture content.
- Are equipped with in-line air-purifying sorbent beds and/or filters that are maintained or replaced following manufacturer's instructions.
- Are tagged with information on the most recent change date of the filter and an authorizing signature.
- Carbon monoxide does not exceed 10 ppm in the breathing air from compressors that are not oil-lubricated.
- High-temperature and carbon monoxide alarms are used on oil-lubricated compressors, or that the air is monitored often enough to ensure that carbon monoxide does not exceed 10 ppm if only a high-temperature alarm is used.

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### **Section(j): IDENTIFICATION OF FILTERS, CARTRIDGES AND CANISTERS**

This section of the standard requires you to ensure that all filters, cartridges and canisters used are labeled and color coded with the NIOSH approval label. You must also ensure that the label is not removed and remains legible.

To fulfill these requirements, you should adopt appropriate procedures for ensuring that:

- Only NIOSH-approved filters, cartridges, and canisters are used
- Labels are not removed, defaced, or obscured during respirator usage

These procedures may be included in your written respiratory protection program.

#### ***What is included on the NIOSH label?***

The label clearly states the class of contaminants for which the filter, cartridge, or canister may be used (e.g., permissible particulate respirator filter for dusts, fumes and mists, including asbestos containing dusts and mists and radionuclides). The NIOSH approval number, and any limitations or precautions are also included on the label.

#### ***What is the purpose of the label?***

The NIOSH label serves several purposes. It ensures selection of the appropriate cartridge/canister for the contaminants found in the workplace. Also, it permits the employee using the respirator to check and confirm that the respirator has the appropriate filters before the respirator is used. Further, the color coding scheme allows fellow employees, supervisors, and the respiratory protection program administrator to readily determine that the employee is using the appropriate filter.

#### ***Can I write the date of initial use on the label?***

Yes. Marking the initial use date on the label can be done in a way that does not obscure the information on the label.

## **Section (k): TRAINING AND INFORMATION**

Employee training is a critical part of a successful respiratory protection program and is essential for correct respirator use. You must provide training to your employees who are required to wear respirators.

### **(k)(1) CONTENT OF TRAINING**

You must ensure that each employee can demonstrate knowledge of at least the following:

- **Why the respirator is necessary and how improper fit, usage, and maintenance can make the respirator ineffective.**

Training must address the identification of hazards, the extent of employee exposure to those hazards, and the potential health effects of exposure. The training that is required under the Hazard Communication standard (29 CFR 1910.1200) can satisfy this requirement for chemical hazards. Employees must understand that proper fit, usage, and maintenance of respirators is critical to ensure that they can perform their protective function.

- **What the limitations and capabilities of the selected respirator are.**

Training must cover how the respirator operates. Included must be an explanation of how the respirator provides protection by filtering the air, absorbing the gas or vapor, or by supplying a clean source of air. Limitations on the use of the equipment, such as prohibitions against using an air-purifying respirator in an IDLH atmosphere, and why not, must also be explained.

- **How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.**

Training must address the possibility of respirator malfunction and the development of emergency situations specific to the worksite. Employees must understand what procedures are to be followed in such circumstances, and which procedures require use of a different respirator.

- **How to inspect, put on and remove, and check the seals of the respirator.**

You must train employees how to recognize problems that may decrease the effectiveness of the respirator and what steps to follow if a problem is detected, such as the person to whom problems should be reported and where replacement equipment can be obtained if

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needed. If specialized personnel conduct inspections, individual respirator wearers only need to be taught about the portions of the inspection process that are their responsibility. You must also cover how to properly put on and remove the respirator to ensure that respirator fit in the workplace is as close as possible to the fit obtained during fit testing. Employees must be trained to perform user seal checks (see Appendix B-1 of the standard in Appendix I of this document).

- **What the respirator maintenance and storage procedures are.**

The extent of training required may vary according to workplace conditions. If employees are individually responsible for storing and maintaining respirators, detailed training may be necessary. If specialized personnel perform these functions, employees only need to be informed of the maintenance and storage procedures.

- **How to recognize medical signs and symptoms that may limit or prevent effective use of the respirator.**

You must instruct employees to recognize medical signs and symptoms, such as shortness of breath or dizziness, that may limit or prevent effective use of respirators. Examples of medical conditions and signs and symptoms that may affect an employee's ability to use a respirator are described in Appendix C of the standard in Appendix I of this document.

- **The general requirements of the Respiratory Protection standard.**

You must ensure that employees are aware, in general, of your obligations under the standard. This discussion need not focus on the standard's provisions but could, for example, simply inform employees that employers are obligated to develop a written program, properly select respirators, evaluate respirator use, correct deficiencies in respirator use, conduct medical evaluations, provide for the maintenance, storage and cleaning of respirators, and retain and provide access to specific records.

***Do I Need to Follow a Particular Format?***

No. As long as the required topics are addressed, you can use whatever training method is effective. Prepared materials, such as audiovisual and slide presentations, formal classroom instruction, informal discussions during safety meetings, training programs developed or conducted by unions or respirator manufacturers, or a combination of these methods may be used.

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### *In what sense are employees expected to be able to “demonstrate knowledge” of proper respirator use based on the training?*

You must ensure that, before an employee is required to use a respirator in the workplace, he or she understands the information provided and can use the respirator properly. This can be done by reviewing the training with the employee either orally or in writing, and by reviewing the employee’s hands-on use of respirators.

#### **(k)(2) COMPREHENSION OF TRAINING**

Training must be conducted in a manner that is understandable to your employees. This means that your program should be tailored to your employees’ education level and language background.

#### **(k)(3) TIMING OF TRAINING**

You must provide the required training prior to requiring an employee to use a respirator in the workplace.

#### **(k)(4) PORTABILITY OF TRAINING**

If you can demonstrate that a new employee has received training within the last 12 months and can demonstrate the necessary knowledge, you are not required to repeat this training. In cases where training in some elements is lacking or inadequate, you are required to provide training in those elements. Previous training not repeated initially must be provided no later than 12 months from the date of the previous training.

#### **(k)(5) RETRAINING**

You must retrain employees in the proper use of respirators annually. You must also retrain employees when:

- Changes in the workplace or the type of respirator make previous training obsolete.
- The knowledge and skill necessary to use the respirator properly has not been retained by the employee.
- Any other situation arises in which retraining appears necessary to ensure safe respirator

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use.

### **(k)(6) INFORMATION FOR VOLUNTARY RESPIRATOR USERS**

For employees who choose to wear a respirator but are not required to do so, you are only required to provide the advisory information in Appendix D of the standard. This basic information on the proper use of respirators can be presented to the employee either verbally or in written form. Training is not required for employees who are not required to wear respirators, i.e., for employees who are wearing respirators voluntarily.

#### **TRAINING AND INFORMATION CHECKLIST**

Check that at your facility:

- Employees can demonstrate knowledge of:
  - Why the respirator is necessary and the consequences of improper fit, use, or maintenance.
  - Limitations and capabilities of the respirator.
  - How to effectively use the respirator in emergency situations.
  - How to inspect, put on, remove, use, and check the seals of the respirator.
  - Maintenance and storage procedures.
  - The general requirements of the respirator standard.
- Training is understandable to employees.
- Training is provided prior to employee use of a respirator.
- Retraining is provided:
  - Annually.
  - Upon changes in workplace conditions that affect respirator use.
  - Whenever retraining appears necessary to ensure safe respirator use.
- Appendix D of the standard is provided to voluntary users.

## **Section (I): PROGRAM EVALUATION**

### **(I)(1) CONDUCTING PROGRAM EVALUATIONS**

You must perform evaluations of the workplace as necessary to make sure that your written respiratory protection program is working effectively.

#### ***How often do I need to evaluate my written respiratory protection program?***

You do not need to review your respiratory protection program according to any fixed schedule. The frequency with which you need to evaluate your respiratory protection program will depend on the complexity and/or variability of the program and factors such as:

- The type and extent of hazards in your workplace.
- The types of respirators used by your employees.
- The number of your employees who use respirators.
- The amount of experience your respirator-wearing employees have in using respirators.

You must evaluate respirator use with sufficient frequency to ensure that all elements of the respiratory protection program are being effectively implemented.

### **(I)(2) CONSULTING WITH EMPLOYEES**

You must regularly consult with employees required to wear respirators to assess their views on the effectiveness of the respiratory protection program and to identify any problems that they may be encountering with the use of respirators. You must correct any problems that are identified. At a minimum, you must assess:

- Whether proper fit of respirators is being achieved, and whether respirator use is interfering with effective work performance.
- Whether appropriate respirators have been selected.
- Whether respirators are being properly used.



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- Whether respirators are being properly maintained.

### *When I consult with my employees, what should I ask them?*

You may want to ask your employees questions such as:

- Does your respirator interfere with your hearing or vision?
- Do you experience fatigue or have difficulty breathing during respirator use?
- Does your respirator restrict your movements or interfere with your job performance in any way?
- Is your respirator uncomfortable?
- Are you confident that you are using your respirator correctly?
- Are you confident that your respirator is performing adequately?

### **PROGRAM EVALUATION CHECKLIST**

Check that at your facility:

- Workplace evaluations are being conducted as necessary to ensure that the written respiratory protection program is being effectively implemented.
- Employees required to wear respirators are being regularly consulted to assess the employees' views and to identify problems with respirator fit, selection, use and maintenance.
- Any problems identified during assessments are corrected.

## **Section (m): RECORDKEEPING**

To assist you in auditing the adequacy of your respiratory protection program, to facilitate employee involvement, and to provide a record for compliance determinations by OSHA, you must retain certain records.

### **(m)(1) MEDICAL EVALUATION RECORDS**

Records of medical evaluations required by the standard and described in section (e) of this guide must be retained and made available to the affected employees in accordance with OSHA's Access to Employee Exposure and Medical Records standard (29 CFR 1910.1020).

### **(m)(2) RESPIRATOR FIT TESTING RECORDS**

You are required to retain written records of the qualitative and quantitative fit tests administered to your employees. These records need to include:

- The name or identification of the employee tested.
- The type of fit test performed.
- The make, model, and size of the respirator tested.
- The date of the fit test.
- Pass/fail results if a qualitative fit test (QLFT) is used, or the fit factor and strip chart recording or other record of the test results if a quantitative fit test (QNFT) is used.

#### ***How long do I need to retain fit test records?***

Fit test records must be retained for respirator users until the next fit test is administered.

#### ***Do I need to retain records of fit tests for employees who are no longer using respirators?***

No. Fit test records do not need to be retained for these employees.

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**(m)(3) WRITTEN RESPIRATORY PROTECTION PROGRAM**

You must retain a written copy of your current respiratory protection program.

**(m)(4) ACCESS TO RECORDS**

Written materials required to be retained must be made available upon request to the affected employees, their designated representatives, and to OSHA. See 29 CFR 1910.1020 for more information.

*Do I need to allow employees and OSHA to make copies of these materials?*

Yes. You need to make these materials available for inspection and for copying.

*Must employees be allowed access to the records of other employees?*

No. Each affected employee can have access to his or her records only.

**RECORDKEEPING CHECKLIST**

Check that at your facility:

- Records of medical evaluations have been retained.
- Fit testing records have been retained.
- A copy of the current respiratory protection program has been retained.
- Access to these records is provided to affected employees.

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### **Section (n): DATES**

This portion of the Respiratory Protection standard sets forth the dates by which you must meet the requirements of the revised Respiratory Protection standard.

#### **(n)(1) EFFECTIVE DATE**

The revised Respiratory Protection standard became effective on October 5, 1998.

#### **(n)(4) EXISTING RESPIRATORY PROTECTION PROGRAMS**

You may use the results of training, fit testing, or program or medical evaluations conducted within twelve months prior to April 8, 1998 to comply with the revised Respiratory Protection standard, if the results meet the requirements of the standard.

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**APPENDIX I**

**Respiratory Protection Standard (29 CFR 1910.134)**

**Shipyards (29 CFR 1915.154)**

**Marine Terminals (29 CFR 1917.92)**

**Longshoring (29 CFR 1918.102)**

**Construction (29 CFR 1926.103)**

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**APPENDIX II**

**OSHA Area and Regional Offices  
States With Consultation Programs and Approved OSHA Plans**

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### OSHA AREA OFFICES (By state, in alphabetical order)

US Department of Labor - OSHA  
2047 Canyon Road - Todd Mall  
Birmingham, AL 35216  
Telephone:(205) 731-1534

US Department of Labor - OSHA  
3737 Government Blvd., Suite 100  
Mobile, AL 36693  
Telephone:(205) 441-6131

US Department of Labor - OSHA  
301 W. Northern Lights Blvd.  
Suite 407  
Anchorage, AK 99503  
Telephone:(907) 271-5152

US Department of Labor - OSHA  
3221 North 16th Street, Suite 100  
Phoenix, AZ 85016  
Telephone:(602) 640-2007

US Department of Labor - OSHA  
425 West Capitol  
Suite 450  
Little Rock, AR 72201  
Telephone:(501) 324-6292

US Department of Labor - OSHA  
71 Stevenson Street, Suite 415  
San Francisco, CA 94105  
Telephone:(415) 744-7120

US Department of Labor - OSHA  
1391 North Speer Blvd.  
Suite 210  
Denver, CO 80204  
Telephone:(303) 844-5285

US Department of Labor - OSHA  
7935 E. Prentice Ave., Suite 209  
Englewood, CO 80111-2714  
Telephone:(303) 843-4500

## Small Entity Compliance Guide

US Department of Labor - OSHA  
One Lafayette Square, Suite 202  
Bridgeport, CT 06604  
Telephone:(203) 579-5579

US Department of Labor - OSHA  
Federal Office Building  
450 Main Street, Room 508  
Hartford, CT 06103  
Telephone:(203) 240-3152

US Department of Labor - OSHA  
Jacaranda Executive Court  
8040 Peters Road  
Building H-100  
Fort Lauderdale, FL 33324  
Telephone:(305) 424-0242

US Department of Labor - OSHA  
Ribault Building  
1851 Executive Center Drive  
Suite 227  
Jacksonville, FL 32207  
Telephone:(904) 232-2895

US Department of Labor - OSHA  
5807 Breckenridge Pkwy.  
Suite A  
Tampa, FL 33610  
Telephone:(813) 626-1177

US Department of Labor - OSHA  
450 Mall Blvd., Suite J  
Savannah, GA 31406  
Telephone:(912) 652-4393

US Department of Labor - OSHA  
2400 Herodian Way, Suite 250  
Smyrna, GA 30080  
Telephone:(404) 984-8700

US Department of Labor - OSHA  
Bldg. 7, Suite 110  
La Vista Perimeter Office Park  
Tucker, GA 30084



## Small Entity Compliance Guide

Telephone:(770) 493-6644

US Department of Labor - OSHA  
300 Ala Moana Blvd., Suite 5122  
Honolulu, HI 96850  
Telephone:(808) 541-2685

US Department of Labor - OSHA  
3050 N. Lakeharbor Lane  
Suite 134  
Boise, ID 83703  
Telephone:(208) 334-1867

US Department of Labor - OSHA  
1600 167th Street, Suite 12  
Calumet City, IL 60409  
Telephone:(708) 891-3800

US Department of Labor - OSHA  
2360 E. Devon Avenue  
Suite 1010  
Des Plaines, IL 60018  
Telephone:(708) 803-4800

US Department of Labor - OSHA  
344 Smoke Tree Business Park  
North Aurora, IL 60542  
Telephone:(630) 803-896-8700

US Department of Labor - OSHA  
2918 West Willow Knolls Road  
Peoria, IL 61614  
Telephone:(309) 671-7033

US Department of Labor - OSHA  
46 East Ohio Street, Room 423  
Indianapolis, IN 46204  
Telephone:(317) 226-7290

US Department of Labor - OSHA  
210 Walnut Street, Room 815  
Des Moines, IA 50309  
Telephone:(515) 284-4794

US Department of Labor - OSHA

## Small Entity Compliance Guide

300 Epic Center  
301 N. Main  
Wichita, KS 67202  
Telephone:(316) 269-6644

US Department of Labor - OSHA  
John C. Watts Fed. Bldg., Room 108  
330 W. Broadway  
Frankfort, KY 40601  
Telephone:(502) 227-7024

US Department of Labor - OSHA  
2156 Wooddale Blvd.  
Hoover Annex, Suite 200  
Baton Rouge, LA 70806  
Telephone:(504) 389-0474

US Department of Labor - OSHA  
U.S. Federal Building  
202 Harlow Street,  
Room 211  
Bangor, ME 04401  
Telephone:(207) 941-8177

US Department of Labor - OSHA  
300 West Pratt Street  
Suite 280  
Baltimore, MD 21201  
Telephone:(410) 962-2840

US Department of Labor - OSHA  
639 Granite Street, 4th Floor  
Braintree, MA 02184  
Telephone:(617) 565-6924

US Department of Labor - OSHA  
Valley Office Park  
13 Branch Street  
Methuen, MA 01844  
Telephone:(617) 565-8110

US Department of Labor - OSHA  
1145 Main Street, Room 108  
Springfield, MA 01103-1493  
Telephone:(413) 785-0123

## Small Entity Compliance Guide

US Department of Labor - OSHA  
801 South Waverly Rd.  
Suite 306  
Lansing, MI 48917-4200  
Telephone:(517) 377-1892

US Department of Labor - OSHA  
Federal Courts Bldg.  
110 South 4th Street, Room 116  
Minneapolis, MN 55401  
Telephone:(612) 348-1994

US Department of Labor - OSHA  
3780 I-55 North  
Suite 210  
Jackson, MS 39211  
Telephone:(601) 965-4606

US Department of Labor - OSHA  
6200 Connecticut Avenue, Suite 100  
Kansas City, MO 64120  
Telephone:(816) 483-9531

US Department of Labor - OSHA  
911 Washington Avenue  
Room 420  
St. Louis, MO 63101  
Telephone:(314) 425-4249

US Department of Labor - OSHA  
19 N. 25th Street  
Billings, MT 59101  
Telephone:(406) 657-6649

US Department of Labor - OSHA  
Overland Wolf Bldg., Room 100  
6910 Pacific Street  
Omaha, NE 68106  
Telephone:(402) 221-3182

US Department of Labor - OSHA  
1050 East Williams, Suite 435  
Carson City, NV 89701  
Telephone:(702) 885-6963

## Small Entity Compliance Guide

US Department of Labor - OSHA  
279 Pleasant Street, Suite 201  
Concord, NH 03301  
Telephone:(603) 225-1629

US Department of Labor - OSHA  
1030 Saint Georges Ave.  
Plaza 35, Suite 205  
Avenel, NJ 07001  
Telephone:(908) 750-3270

US Department of Labor - OSHA  
500 Route 17 South, 2nd Floor  
Hasbrouck Heights, NJ 07604  
Telephone:(201) 288-1700

US Department of Labor - OSHA  
Marlton Executive Park  
701 Route 73 South Bldg. 2  
Suite 120  
Marlton, NJ 08053  
Telephone:(609) 757-5181

US Department of Labor - OSHA  
299 Cherry Hill Road, Suite 304  
Parsippany, NJ 07054  
Telephone:(201) 263-1003

US Department of Labor - OSHA  
505 Marquette Avenue, NW  
Suite 820  
Albuquerque, NM 87102-2160  
Telephone:(505) 248-5302

US Department of Labor - OSHA  
401 New Karner Road  
Suite 300  
Albany, New York 12205-3809  
Telephone:(518) 464-6742

US Department of Labor - OSHA  
42-40 Bell Blvd. 5th Floor  
Bayside, NY 11361  
Telephone:(718) 279-9060

## Small Entity Compliance Guide

US Department of Labor - OSHA  
5360 Genesee Street  
Bowmansville, NY 14026  
Telephone:(716) 684-3891

US Department of Labor - OSHA  
90 Church Street, Room 1407  
New York, NY 10007  
Telephone:(212) 264-9840

US Department of Labor - OSHA  
3300 Vikery Road, North New  
Syracuse, NY 13212  
Telephone:(315) 451-0808

US Department of Labor - OSHA  
660 White Plains Road  
4th Floor  
Tarrytown, NY 10591-5107  
Telephone:(914) 524-7510

US Department of Labor - OSHA  
990 Westbury Road  
Westbury, NY 11590  
Telephone:(516) 334-3344

US Department of Labor - OSHA  
Century Station, Room 438  
300 Fayetteville Street Mall  
Raleigh, NC 27601  
Telephone:(919) 856-4770

US Department of Labor - OSHA  
220 E. Rosser, Room 348  
P.O. Box 2439  
Bismarck, ND 58501  
Telephone:(701) 250-4521

US Department of Labor - OSHA  
36 Triangle Park Drive  
Cincinnati, OH 45246  
Telephone:(513) 841-4132

US Department of Labor - OSHA  
Federal Office Building, Room 899

## Small Entity Compliance Guide

1240 East Ninth Street  
Cleveland, OH 44199  
Telephone:(216) 522-3818

US Department of Labor - OSHA  
Federal Office Bldg., Room 620  
200 N. High Street  
Columbus, OH 43215  
Telephone:(614) 469-5582

US Department of Labor - OSHA  
Federal Office Bldg., Room 734  
234 North Summit Street  
Toledo, OH 43604  
Telephone:(419) 259-7542

US Department of Labor - OSHA  
420 West Main Place, Suite 300  
Oklahoma City, OK 73102  
Telephone:(405) 231-5351

US Department of Labor - OSHA  
1220 S.W. Third Avenue, Room 640  
Portland, OR 97294  
Telephone:(503) 326-2251

US Department of Labor - OSHA  
850 N. 5th Street  
Allentown, PA 18102  
Telephone:(610) 776-0592

US Department of Labor - OSHA  
3939 West Ridge Road  
Suite B-12  
Erie, PA 16506-1857  
Telephone:(814) 833-5758

US Department of Labor - OSHA  
Progress Plaza  
49 N. Progress Street  
Harrisburg, PA 17109  
Telephone:(717) 782-3902

US Department of Labor - OSHA  
U.S. Custom House, Room 242

## Small Entity Compliance Guide

Second and Chestnut Street  
Philadelphia, PA 19106  
Telephone:(215) 597-4955

US Department of Labor - OSHA  
Federal Building, Room 1428  
1000 Liberty Avenue  
Pittsburgh, PA 15222  
Telephone:(412) 644-2903

US Department of Labor - OSHA  
Penn Place, Room 2005  
20 North Pennsylvania Avenue  
Wilkes-Barre, PA 18701  
Telephone:(717) 826-6538

US Department of Labor - OSHA  
BBV Plaza Building, Suite 5B  
1510 F.D. Roosevelt Avenue  
Guaynabo, PR 00968  
Telephone: (787) 277-1560  
Telephone:(809) 766-5457

US Department of Labor - OSHA  
380 Westminster Mall, Room 243  
Providence, RI 02903  
Telephone:(401) 528-4669

US Department of Labor - OSHA  
1835 Assembly Street, Room 1468  
Columbia, SC 29201  
Telephone:(803) 765-5904

US Department of Labor - OSHA  
2002 Richard Jones Road  
Suite C-205  
Nashville, TN 37215  
Telephone:(615) 781-5423

US Department of Labor - OSHA  
903 San Jacinto Blvd.  
Suite 319  
Austin, TX 78701  
Telephone:(512) 916-5783

## Small Entity Compliance Guide

US Department of Labor - OSHA  
Wilson Plaza  
606 N. Carancahua, Suite 700  
Corpus Christi, TX 78476  
Telephone:(512) 884-2694

US Department of Labor - OSHA  
8344 East R.L. Thornton Freeway  
Suite 420  
Dallas, TX 75228  
Telephone:(214) 320-2400

US Department of Labor - OSHA  
North Star 2 Building  
Suite 430  
8713 Airport Freeway  
Fort Worth, TX 76180-7604  
Telephone:(817) 885-7025

US Department of Labor - OSHA  
17625 El Camino Real, Suite 400  
Houston, TX 77058  
Telephone:(713) 286-0583

US Department of Labor - OSHA  
350 North Sam Houston Parkway  
Suite 120  
Houston, TX 77058  
Telephone:(713) 591-2438

US Department of Labor - OSHA  
Federal Building, Room 422  
1205 Texas Avenue  
Lubbock, TX 79401  
Telephone:(806) 743-7681

US Department of Labor - OSHA  
1781 South 300 West  
Salt Lake City, UT 84165-0200  
Telephone:(801) 524-5080

US Department of Labor - OSHA  
AFOB, Room 835  
200 Granby Mall  
Norfolk, VA 23510



## Small Entity Compliance Guide

Telephone:(804) 441-3820

US Department of Labor - OSHA  
505 16th Avenue, N.E.  
Bellevue, WA 98004  
Telephone:(206) 553-7520

US Department of Labor - OSHA  
550 Eagan Street, Room 206  
Charleston, WV 25301  
Telephone:(304) 347-5937

US Department of Labor - OSHA  
2618 North Ballard Road  
Appleton, WI 54915  
Telephone:(414) 734-4521

US Department of Labor - OSHA  
4802 East Broadway  
Madison, WI 53716  
Telephone:(608) 264-5388

US Department of Labor - OSHA  
Henry S. Reuss Bldg.  
Suite 1180  
310 West Wisconsin Ave.  
Milwaukee, WI 53203  
Telephone:(414) 297-3315

### **OSHA REGIONAL OFFICES**

**U.S. Department of Labor  
Occupational Safety and Health Administration  
Regional Offices**

**Region I  
(CT,\* MA, ME, NH, RI, VT\*)**  
133 Portland Street  
1st Floor  
Boston, MA 02114  
Telephone: (617) 565-9860

## Small Entity Compliance Guide

### **Region II**

**(NJ, NY,\* PR,\* VI\*)**

201 Varick Street

Room 670

New York, NY 10014

Telephone: (212) 337-2378

### **Region III**

**(DC, DE, MD,\* PA, VA,\* WV)**

Gateway Building, Suite 2100

3535 Market Street

Philadelphia, PA 19104

Telephone: (215) 596-1201

### **Region IV**

**(AL, FL, GA, KY,\* MS, NC, SC,\* TN\*)**

1375 Peachtree Street, N.E.

Suite 587

Atlanta, GA 30367

Telephone: (404) 347-3573

### **Region V**

**(IL, IN,\* MI,\* MN,\* OH, WI)**

230 South Dearborn Street

Room 3244

Chicago, IL 60604

Telephone: (312) 353-2220

### **Region VI**

**(AR, LA, NM,\* OK, TX)**

525 Griffin Street

Room 602

Dallas, TX 75202

Telephone: (214) 767-4731

### **Region VII**

**(IA,\* KS, MO, NE)**

City Center Square

1100 Main Street, Suite 800

Kansas City, MO 64105

Telephone: (816) 426-5861

## Small Entity Compliance Guide

### **Region VIII**

**(CO, MT, ND, SD, UT,\* WY\*)**

1999 Broadway, Suite 1690

Denver, CO 80202-5716

Telephone: (303) 844-1600

### **Region IX**

**(American Samoa, AZ,\* CA,\* Guam,**

**HI,\* NV,\* Trust Territories of the Pacific)**

71 Stevenson Street

Room 420

San Francisco, CA 94105

Telephone: (415) 975-4310

### **Region X**

**(AK,\* ID, OR,\* WA\*)**

1111 Third Avenue

Suite 715

Seattle, WA 98101-3212

Telephone: (206) 553-5930

\*These states and territories operate their own OSHA-approved job safety and health programs (Connecticut and New York plans cover public employees only). States with approved programs must have a standard that is identical to, or at least as effective as, the federal standard.

Small Entity Compliance Guide

**States With Consultation Programs and Approved OSHA Plans**

**States With Consultation Programs**

**ALABAMA**

Safe State Program  
University of Alabama  
432 Martha Parham West  
PO Box 870388  
Tuscaloosa, Alabama 35487  
(205) 348-3033 Fax: (205) 348-3049

**ALASKA**

ADOL/OSHA Division of Consultation  
3301 Eagle Street  
P.O. Box 107022  
Anchorage, Alaska 99510  
(907) 269-4957 Fax: (907) 269-4950

**ARIZONA**

Consultation and Training  
Industrial Commission of Arizona  
Division of Occupational Safety & Health  
800 West Washington  
Phoenix, Arizona 85007  
(602) 542-5795 Fax: (602) 542-1614

**ARKANSAS**

OSHA Consultation  
Arkansas Department of Labor  
10421 West Markham  
Little Rock, Arkansas 72205  
(501) 682-4522 Fax: (501) 682-4532

**CALIFORNIA**

CAL/OSHA Consultation Service  
Department of Industrial Relations  
Room 1260  
45 Fremont Street  
San Francisco, California 94105  
(415) 972-8515 Fax: (415) 972-8513

**States with Approved State Plans**

**ALASKA**

Alaska Department of Labor  
1111 W. 8th Street, Room 306  
Juneau, Alaska 99801  
(907) 465-2700 Fax: (907) 465-2784

**ARIZONA**

Industrial Commission of Arizona  
800 W. Washington  
Phoenix, Arizona 85007  
(602) 542-5795 Fax: (602) 542-1614

**CALIFORNIA**

California Department of Industrial Relations  
45 Fremont Street  
San Francisco, California 94105  
(415) 972-8500 Fax: (415) 972-8513

## Small Entity Compliance Guide

### States With Consultation Programs

#### COLORADO

Colorado State University  
Occupational Safety and Health Section  
115 Environmental Health Building  
Fort Collins, Colorado 80523  
(970) 491-6151 Fax:(970) 491-7778

#### CONNECTICUT

Connecticut Department of Labor  
Division of Occupational Safety & Health  
38 Wolcott Hill Road  
Wethersfield, Connecticut 06109  
(203) 566-4550 Fax: (203) 566-6916

#### DELAWARE

Delaware Department of Labor  
Division of Industrial Affairs  
Occupational Safety and Health  
4425 Market Street  
Wilmington, Delaware 19802  
(302) 761-8219 Fax: (302) 761-6601

#### WASHINGTON D.C.

DC Department of Employment Services  
Office of Occupational Safety and Health  
950 Upshur Street, N.W.  
Washington, D.C. 20011  
(202) 576-6339 Fax: (202) 576-7282

#### FLORIDA

Florida Department of Labor and  
Employment Security  
7(c)(1) onsite consultation Program Division  
of Safety  
2002 St. Augustine Road,  
Building E, Suite 45  
Tallahassee, Florida 32399  
(850) 922 8955 Fax: (850) 922-4538

### States with Approved State Plans

#### CONNECTICUT

Connecticut Department of Labor  
200 Folly Brook Boulevard  
Wethersfield, Connecticut 06109  
(860) 566-5123 Fax: (860)566-1520

## Small Entity Compliance Guide

### States With Consultation Programs

#### GEORGIA

7(c)(1) Onsite Consultation Program  
Georgia Institute of Technology  
O'Keefe Building, Room 22  
Atlanta, Georgia 30332  
(404) 894-2643 Fax: (404) 894-8275

#### GUAM

OSHA Onsite Consultation  
Department of Labor, Government of Guam  
P.O. Box 9970  
Tamuning, Guam 69631  
(671) 475-0361 Fax: (671) 477-2988

#### HAWAII

Consultation & Training Branch  
Department of Labor and Industrial Relations  
830 Punchbowl Street  
Honolulu, Hawaii 96813  
(808) 586-9100 Fax: (808) 586-9099

#### IDAHO

Boise State University, Department of health  
Studies  
1910 University Drive, ET-338A  
Boise, Idaho 83725  
(208) 385-3283 Fax: (208) 385-4411

#### ILLINOIS

Illinois Onsite Consultation  
Industrial Service Division  
Department of Commerce & Community  
Affairs  
State of Illinois Center, Suite 3-400  
100 West Randolph Street  
Chicago, Illinois 60601  
(312) 814-2337 Fax: (312) 814-7238

### States with Approved State Plans

#### HAWAII

Hawaii Department of labor and Industrial  
Relations  
830 Punchbowl Street  
Honolulu, Hawaii 96813  
(808) 586-9116 Fax: (808) 586-9104

## Small Entity Compliance Guide

### States With Consultation Programs

#### INDIANA

Bureau of Safety, Education and Training  
Division of Labor, Room W195  
402 West Washington  
Indianapolis, Indiana 46204  
(317) 232-2688 Fax: (317) 232 0748

#### IOWA

7(c)(1) Consultation Program  
Iowa Bureau of Labor  
1000 East grand Avenue  
Des Moines, Iowa 50319  
(515) 281-5352 Fax: (515) 281-4831

#### KANSAS

Kansas 7(c)(1) Consultation  
Department of Human Resources  
512 South west 6th Street  
Topeka, Kansas 40601  
(913) 296-7476 Fax: (913) 296-1775

#### KENTUCKY

Division of Education and Training  
Kentucky labor Cabinet  
1047 U.S. Highway 127 South  
Frankfort, Kentucky 40601  
(502) 564-6895 Fax: (502) 564-4769

#### LOUISIANA

7(c)(1) Consultation Program  
Louisiana Department of Labor  
OWC-OSHA Consultation  
P.O. Box 94094  
Baton Rouge, Louisiana 70804  
(504) 342-9601 Fax: (504) 342-5158

### States with Approved State Plans

#### INDIANA

Indiana Department of Labor  
State Office Building  
402 West Washington Street  
Room W195  
Indianapolis, Indiana 46204  
(317) 232-2378 Fax: (317)233-3790

#### IOWA

Iowa Division of Labor  
1000 E. Grand Avenue  
Des Moines, Iowa 50319  
(515) 281-3469 Fax: (515) 281-7995

#### KENTUCKY

Kentucky Labor Cabinet  
1047 U.S. highway 127 South STE 2  
Frankfort, Kentucky 40601  
(502) 564-3070 Fax: 564-5387

## Small Entity Compliance Guide

### States With Consultation Programs

#### MAINE

Division of Industrial Labor  
Maine Bureau of Labor  
State House Station #82  
Augusta, Maine 04333  
(207) 624-6460 Fax: (207) 624-6449

#### MARYLAND

Division of Labor and Industry  
312 Marshall Avenue, Room 600  
Laurel, Maryland 20707  
(410) 880-4970 Fax: (410) 880-6369

#### MASSACHUSETTS

The Commonwealth of Massachusetts  
Department of Labor & Industries  
1001 Watertown Street  
West Newton, Massachusetts 02165  
(617) 727-3982 Fax: (617) 727-4581

#### MICHIGAN (HEALTH)

Michigan Department of Public Health  
Division of Occupational Health  
3423 North Martin Luther King Boulevard  
Lansing, Michigan 48909  
(517) 335-8250 Fax: (517) 335-8010

#### MICHIGAN (SAFETY)

Michigan department of Consumer and  
Industry Services  
7150 Harris Drive  
Lansing, Michigan 48909  
(517) 332-1809 Fax: (517) 332-1374

### States with Approved State Plans

#### MARYLAND

Maryland Division of Labor and Industry  
Department of labor Licensing and  
Regulation  
1100 N. Eutaw Street, Room 613  
Baltimore, Maryland 21201-2206  
(410) 767-2215 Fax: (410) 767-2003

#### MICHIGAN

Michigan Department of Consumer and  
Industry Relations  
4th Floor, Law Building  
P.O. Box 30004  
Lansing, Michigan 48909  
(517) 373-7230 Fax: (517) 373-2129



## Small Entity Compliance Guide

### States With Consultation Programs

MINNESOTA  
Department of Labor and Industry  
443 Lafayette Road  
Saint Paul, Minnesota 55155  
(612) 297-2393 Fax: (612) 297-1953

MISSISSIPPI  
Mississippi State University  
Center for Safety and Health  
2906 North State Street, Suite 201  
Jackson, Mississippi 39216  
(601) 987-3981 Fax: (601) 987-3890

MISSOURI  
Division of Labor Standards  
Onsite Consultation program  
Department of Labor and Industrial Relations  
3315 West Truman Boulevard  
P.O. Box 449  
Jefferson City, Missouri 65102  
(573) 751-3721, (800) 475-2130

MONTANA  
Department of Labor and Industry  
Bureau of Safety  
P.O. Box 1728  
Helena, Montana 59624-1728  
(406) 444-6418 Fax: (406) 444-4140

NEBRASKA  
Division of Safety Labor and Safety  
Standards  
Nebraska Department of Labor  
State Office Building, Lower Level  
301 Centennial mall, South  
Lincoln, Nebraska 68509-5024  
(402) 471-4717 Fax: (402) 471-5039

### States with Approved State Plans

MINNESOTA  
Minnesota Department of Labor and Industry  
443 Lafayette road  
St. Paul, Minnesota 55155  
(612) 296-2342 Fax: (612) 282-5405

## Small Entity Compliance Guide

### States With Consultation Programs

#### NEVADA

Division of Preventive Safety  
Department of Industrial Relations, Suite 106  
2500 West Washington  
Las Vegas, Nevada 89106  
(702) 486-5016 Fax: (702) 486-5331

#### NEW HAMPSHIRE

New Hampshire Department of Health  
Division of Public Health Services  
6 Hazen Drive  
Concord, New Hampshire 03301-6527  
(603) 271-2024 Fax: (603) 271-2667

#### NEW JERSEY

New Jersey Department of Labor  
Division of Public Safety and Occupational  
Safety and Health  
225 E. State Street  
8th Floor West  
P.O. Box 953  
Trenton, New Jersey 08625-0953  
(609) 292-3923 Fax: (609) 292-4409

#### NEW MEXICO

New Mexico Environmental Department  
Occupational Health and Safety Bureau  
525 camino de Los Marquez, Suite 3  
P.O. Box 26110  
Santa Fe, New Mexico 87502  
(505) 827-4230 Fax: (505) 827-4422

#### NEW YORK

Division of Safety and Health  
State Office Campus  
Building 12, Room 130  
Albany, New York 12240  
(518) 457-1169 Fax: (518) 457-3454

### States with Approved State Plans

#### NEVADA

Nevada Division of Industrial Relations  
400 West King Street  
Carson City, Nevada 89703  
(702) 687-3032 Fax: (702) 687-6305

#### NEW MEXICO

New Mexico Environment Department  
1190 St. Francis Drive  
P.O. Box 26110  
Santa Fe, New Mexico 87502  
(505) 827-2850 Fax: (505) 827-2836

#### NEW YORK

New York Department of Labor  
W. Averell Harriman State Office  
Building 12, room 500  
Albany, New York 12240  
(518) 457-2741 Fax: (518) 457-6908

## Small Entity Compliance Guide

### States With Consultation Programs

#### NORTH CAROLINA

Bureau of Consultative Services  
North Carolina Department of Labor  
319 Chapanoke Road, Suite 105  
Raleigh, North Carolina 27603-3432  
(919) 662-4644 Fax: (919) 662-4671

#### NORTH DAKOTA

Division of Environmental Engineering  
1200 Missouri Avenue, Room 304  
Bismarck, North Dakota 58504  
(701) 328-5188 Fax: (701) 328-5200

#### OHIO

Bureau of Employment Services  
145 S. Front Street  
Columbus, Ohio 43216  
(614) 644-2246 Fax: (614) 644-3133

#### OKLAHOMA

Oklahoma Department of Labor  
OSHA Division  
4001 North Lincoln Boulevard  
Oklahoma City, Oklahoma 73105-5212  
(405) 528-1500 Fax: (405) 528-5751

#### OREGON

Department of Consumer and Business  
Services  
Oregon Occupational Safety and Health  
Division  
350 Winter Street NE, Room 430  
Salem, Oregon 97310  
(503) 378-3272 Fax: (503) 378-5729  
toll free: (800) 922-2689

### States with Approved State Plans

#### NORTH CAROLINA

North Carolina Department of Labor  
319 Chapanoke Road  
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## Small Entity Compliance Guide

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Department of Labor and Human Resources  
21st Floor  
505 Munoz Rivera Avenue  
Hato Rey, Puerto Rico 00918  
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#### RHODE ISLAND

Rhode Island Department of Health  
Division of Occupational Health  
3 Capital Hill  
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#### SOUTH CAROLINA

South Carolina Department of Labor  
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Columbia, South Carolina 29204  
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#### SOUTH DAKOTA

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### States with Approved State Plans

#### PUERTO RICO

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South Carolina Department of Labor,  
Licencing and Regulation  
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## Small Entity Compliance Guide

### States With Consultation Programs

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#### TEXAS

Worker's Health and Safety Division  
Worker's Compensation Commission  
Southfield Building  
4000 South I H 35  
Austin, Texas 78704  
(512) 440-3854 Fax: (512) 440-3831

#### UTAH

Utah industrial Commission  
Consultation Services  
160 East 300 South  
Salt Lake City, Utah 84114-6650  
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#### VERMONT

Division of Occupational Safety and Health  
Vermont Department of Labor and Industry  
National Life Building, Drawer 20  
Montpelier, Vermont 05602-3401  
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#### VIRGINIA

Virgin Department of Labor and Industry  
Occupational Safety and Health  
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### States with Approved State Plans

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### States With Consultation Programs

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#### WASHINGTON

Washington Department of labor and  
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Division of Industrial Safety and Health  
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Olympia, Washington 98504  
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#### WEST VIRGINIA

West Virginia Department of Labor  
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#### WYOMING

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Herschler Building, 2 East  
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### States with Approved State Plans

#### VIRGIN ISLANDS

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2131 Hospital Street  
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Small Entity Compliance Guide

**APPENDIX III**

**Questions and Answers on the Respiratory Protection standard**

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**APPENDIX IV**

**Small Entity Compliance Guide:  
Sample Respiratory Protection Program**



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## Small Entity Compliance Guide

This Sample Respiratory Protection Program is for demonstration purposes only. XYZ Seating is not intended to represent an actual company. XYZ is a hypothetical company that has chosen to interpret certain provisions of 29 CFR 1910.134 in ways that could be different from the way another company might choose to implement it.

## **1.0 Purpose**

XYZ Seating has determined that employees in the Prep, Coating, Assembly, and Maintenance departments are exposed to respiratory hazards during routine operations. These hazards include wood dust, particulates, and vapors, and in some cases represent Immediately Dangerous to Life or Health (IDLH) conditions. The purpose of this program is to ensure that all XYZ Seating employees are protected from exposure to these respiratory hazards.

Engineering controls, such as ventilation and substitution of less toxic materials, are the first line of defense at XYZ Seating; however, engineering controls have not always been feasible for some of our operations, or have not always completely controlled the identified hazards. In these situations, respirators and other protective equipment must be used. Respirators are also needed to protect employees' health during emergencies. The work processes requiring respirator use at XYZ Seating are outlined in Table 1 in the Scope and Application section of this program.

In addition, some employees have expressed a desire to wear respirators during certain operations that do not require respiratory protection. As a general policy XYZ Seating will review each of these requests on a case-by-case basis. If the use of respiratory protection in a specific case will not jeopardize the health or safety of the worker(s), XYZ Seating will provide respirators for voluntary use. As outlined in the Scope and Application section of this program, voluntary respirator use is subject to certain requirements of this program.

## **2.0 Scope and Application**

This program applies to all employees who are required to wear respirators during normal work operations, and during some non-routine or emergency operations such as a spill of a hazardous substance. This includes employees in the Prep, Coating (Spray Booth), Assembly, and Maintenance departments. All employees working in these areas and engaged in certain processes or tasks (as outlined in the table below) must be enrolled in the company's respiratory protection program.

In addition, any employee who voluntarily wears a respirator when a respirator is not required (i.e., in certain maintenance and coating operations) is subject to the medical evaluation, cleaning, maintenance, and storage elements of this program, and must be provided with certain information specified in this section of the program.<sup>1</sup>

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<sup>1</sup> Employees who voluntarily wear filtering facepieces (dust masks) are not subject to the medical evaluation, cleaning, storage, and maintenance provisions of this program.

Employees participating in the respiratory protection program do so at no cost to them. The expense associated with training, medical evaluations and respiratory protection equipment will be borne by the company.

<b>TABLE 1: VOLUNTARY AND REQUIRED RESPIRATOR USE AT XYZ SEATING</b>	
<b>Respirator</b>	<b>Department/Process</b>
Filtering facepiece (dust mask)	Voluntary use for warehouse workers
Half-facepiece APR or PAPR with P100 filter	Prep and Assembly Voluntary use for maintenance workers when cleaning spray booth walls or changing spray booth filter
SAR, pressure demand, with auxiliary SCBA	Maintenance - dip coat tank cleaning
Continuous flow SAR with hood	Spray booth operations Prep (cleaning)*
Half-facepiece APR with organic vapor cartridge	Voluntary use for Dip Coat Tenders, Spray Booth Operators (gun cleaning), and Maintenance workers (loading coating agents into supply systems)
Escape SCBA	Dip Coat, Coatings Storage Area, Spray Booth Cleaning Area

\* until ventilation is installed.

### **3.0 Responsibilities**

#### **Program Administrator**

The Program Administrator is responsible for administering the respiratory protection program. Duties of the program administrator include:

- Identifying work areas, processes or tasks that require workers to wear respirators, and evaluating hazards.
- Selection of respiratory protection options.
- Monitoring respirator use to ensure that respirators are used in accordance with their certifications.
- Arranging for and/or conducting training.
- Ensuring proper storage and maintenance of respiratory protection equipment.

- Conducting qualitative fit testing with Bitrex.
- Administering the medical surveillance program.
- Maintaining records required by the program.
- Evaluating the program.
- Updating written program, as needed.

The Program Administrator for Company XYZ Seating is \_\_\_\_\_.

### **Supervisors**

Supervisors are responsible for ensuring that the respiratory protection program is implemented in their particular areas. In addition to being knowledgeable about the program requirements for their own protection, supervisors must also ensure that the program is understood and followed by the employees under their charge. Duties of the supervisor include:

- Ensuring that employees under their supervision (including new hires) have received appropriate training, fit testing, and annual medical evaluation.
- Ensuring the availability of appropriate respirators and accessories.
- Being aware of tasks requiring the use of respiratory protection.
- Enforcing the proper use of respiratory protection when necessary.
- Ensuring that respirators are properly cleaned, maintained, and stored according to the respiratory protection plan.
- Ensuring that respirators fit well and do not cause discomfort.
- Continually monitoring work areas and operations to identify respiratory hazards.
- Coordinating with the Program Administrator on how to address respiratory hazards or other concerns regarding the program.

### **Employees**

Each employee has the responsibility to wear his or her respirator when and where required and in the manner in which they were trained. Employees must also:

- Care for and maintain their respirators as instructed, and store them in a clean sanitary location.
- Inform their supervisor if the respirator no longer fits well, and request a new one that fits properly.
- Inform their supervisor or the Program Administrator of any respiratory hazards that they feel are not adequately addressed in the workplace and of any other concerns that they have regarding the program.

## 4.0 Program Elements

### Selection Procedures

The Program Administrator will select respirators to be used on site, based on the hazards to which workers are exposed and in accordance with all OSHA standards. The Program Administrator will conduct a hazard evaluation for each operation, process, or work area where airborne contaminants may be present in routine operations or during an emergency. The hazard evaluation will include:

- 1) Identification and development of a list of hazardous substances used in the workplace, by department, or work process.
- 2) Review of work processes to determine where potential exposures to these hazardous substances may occur. This review shall be conducted by surveying the workplace, reviewing process records, and talking with employees and supervisors.
- 3) Exposure monitoring to quantify potential hazardous exposures. Monitoring will be contracted out. XYZ Seating currently has a contract with ABC Industrial Hygiene Services to provide monitoring when needed.

*The results of the current hazard evaluation are the following:*

(Table 3 at the end of this program contains the sampling data that this section was based on.)

**Prep-sanding:** Ventilation controls on some sanders are in place, but employees continue to be exposed to respirable wood dust at 2.5 - 7.0 mg/m<sup>3</sup> (8 hour time-weighted-average, or TWA). Half-facepiece APRs with P100 filters and goggles are required for employees sanding wood pieces. PAPRs will be available for employees who are unable to wear an APR.

**Prep-cleaning:** Average methylene chloride exposures measured at 70 ppm based on 8 hr. TWA exposure results for workers cleaning/stripping furniture pieces. Ventilation controls are planned, but will not be implemented until designs are completed and a contract has been let for installation of the controls. In the meantime, employees must wear supplied air hoods with continuous air flow, as required by the Methylene Chloride standard 1910.1052.

**Coating-spray booth:** XYZ Seating has decided to take a conservative approach and require all employees to wear supplied air respirators when working inside the spray booth. Based on exposure data in published reports on the same type of spray booth operations, the Program Administrator has determined that an SAR in the continuous flow mode will provide sufficient protection. Spray booth employees may opt to wear half-facepiece APRs with organic vapor cartridges when cleaning spray guns.

**Coating-dip coat, and drying:** Exposures are kept within PELs by ventilation, and employees generally enter the dip coat area for short time periods (up to one hour). Vapors could leak into the dip coat and drying areas if the ventilation system is not running at peak efficiency. Odors in this area are often unpleasant even at the levels maintained by the ventilation system. While XYZ Seating notes that respiratory protection is not required in this area, the company recognizes employee concern about breathing vapors and about having to work in an unpleasant environment. Accordingly, employees may voluntarily choose to wear a half-facepiece APR with organic vapor cartridges when working in this area.

**Assembly:** Ventilation controls on sanders are in place, but employees continue to be exposed to respirable wood dust at 2.5 - 6.0 mg/m<sup>3</sup> (8 hour TWA); half-facepiece APRs with P100 filters and goggles are required for employees sanding wood pieces in the assembly department. PAPRs will be available for employees who are unable to wear an APR. The substitution for aqueous-based glues will eliminate exposures to formaldehyde, methylene chloride, and epoxy resins.

**Maintenance:** Because of potential IDLH conditions, employees cleaning dip coat tanks must wear a pressure demand SAR during the performance of this task.

Employees may voluntarily wear half-facepiece APRs with P100 cartridges when cleaning spray booth walls or changing booth filters and half-facepiece APRs with organic vapor cartridges when loading coating agents into supply systems. Although exposure monitoring has shown that exposures are kept within PELs during these procedures, XYZ Seating will provide respirators to workers who are concerned about potential exposures.

#### *Updating the Hazard Assessment*

The Program Administrator must revise and update the hazard assessment as needed (i.e., any time work process changes may potentially affect exposure). If an employee feels that respiratory protection is needed during a particular activity, he/she is to contact his or her supervisor or the Program Administrator. The Program Administrator will evaluate the potential hazard, arranging for outside assistance as necessary. The Program Administrator will then communicate the results of that assessment back to the employees. If it is determined that respiratory protection is necessary, all other elements of this program will be in effect for those tasks and this program will be updated accordingly.

#### *NIOSH Certification*

All respirators must be certified by the National Institute for Occupational Safety and Health (NIOSH) and shall be used in accordance with the terms of that certification. Also, all filters, cartridges, and canisters must be labeled with the appropriate NIOSH approval label. The label must not be removed or defaced while it is in use.

### *Voluntary Respirator Use*

XYZ Seating will provide respirators at no charge to employees for voluntary use for the following work processes:

- Employees may wear half-facepiece APRs with organic vapor cartridges while working in the dip coat area.
- Warehouse workers may wear filtering facepieces.
- Spray Booth Operators may wear half-facepiece APRs with organic vapor cartridges while cleaning spray guns.
- Maintenance personnel may wear half-facepiece APRs with P100 cartridges while cleaning spray booth walls, and organic vapor cartridges while loading spray guns.

The Program Administrator will provide all employees who voluntarily choose to wear either of the above respirators with a copy of Appendix D of the standard. (Appendix D details the requirements for voluntary use of respirators by employees.) Employees choosing to wear a half facepiece APR must comply with the procedures for Medical Evaluation, Respirator Use, and Cleaning, Maintenance and Storage.

The Program Administrator shall authorize voluntary use of respiratory protective equipment as requested by all other workers on a case-by-case basis, depending on specific workplace conditions and the results of the medical evaluations.

### **Medical Evaluation**

Employees who are either required to wear respirators, or who choose to wear an APR voluntarily, must pass a medical exam before being permitted to wear a respirator on the job. Employees are not permitted to wear respirators until a physician has determined that they are medically able to do so. Any employee refusing the medical evaluation will not be allowed to work in an area requiring respirator use.

A licensed physician at ABC medical clinic, where all company medical services are provided, will provide the medical evaluations. Medical evaluation procedures are as follows:

- The medical evaluation will be conducted using the questionnaire provided in Appendix C of the respiratory protection standard. The Program Administrator will provide a copy of this questionnaire to all employees requiring medical evaluations.



- To the extent feasible, the company will assist employees who are unable to read the questionnaire (by providing help in reading the questionnaire). When this is not possible, the employee will be sent directly to the physician for medical evaluation.
- All affected employees will be given a copy of the medical questionnaire to fill out, along with a stamped and addressed envelope for mailing the questionnaire to the company physician. Employees will be permitted to fill out the questionnaire on company time.
- Follow-up medical exams will be granted to employees as required by the standard, and/or as deemed necessary by the ABC medical clinic physician.
- All employees will be granted the opportunity to speak with the physician about their medical evaluation, if they so request.
- The Program Administrator has provided the ABC medical clinic physician with a copy of this program, a copy of the Respiratory Protection standard, the list of hazardous substances by work area, and for each employee requiring evaluation: his or her work area or job title, proposed respirator type and weight, length of time required to wear respirator, expected physical work load (light, moderate, or heavy), potential temperature and humidity extremes, and any additional protective clothing required.
- Any employee required for medical reasons to wear a positive pressure air purifying respirator will be provided with a powered air purifying respirator.
- After an employee has received clearance and begun to wear his or her respirator, additional medical evaluations will be provided under the following circumstances:
  - Employee reports signs and/or symptoms related to their ability to use a respirator, such as shortness of breath, dizziness, chest pains, or wheezing.
  - The ABC medical clinic physician or supervisor informs the Program Administrator that the employee needs to be reevaluated;
  - Information from this program, including observations made during fit testing and program evaluation, indicates a need for reevaluation;
  - A change occurs in workplace conditions that may result in an increased physiological burden on the employee.

A list of XYZ Seating employees currently included in medical surveillance is provided in Table 2 of this program.

All examinations and questionnaires are to remain confidential between the employee and the physician.

## **Fit Testing**

Fit testing is required for employees wearing half-facepiece APRs for exposure to wood dust in Prep and Assembly, and maintenance workers who wear a tight-fitting SAR for dip tank cleaning. Employees voluntarily wearing half-facepiece APRs may also be fit tested upon request.

Employees who are required to wear half-facepiece APRs will be fit tested:

- Prior to being allowed to wear any respirator with a tight fitting facepiece.
- Annually.
- When there are changes in the employee's physical condition that could affect respiratory fit (e.g., obvious change in body weight, facial scarring, etc.).

Employees will be fit tested with the make, model, and size of respirator that they will actually wear. Employees will be provided with several models and sizes of respirators so that they may find an optimal fit. Fit testing of PAPRs is to be conducted in the negative pressure mode.

The Program Administrator will conduct fit tests following the OSHA approved Bitrex Solution Aerosol QLFT Protocol in Appendix B (B4) of the Respiratory Protection standard.

The Program Administrator has determined that QNFT is not required for the respirators used under current conditions at XYZ Seating. If conditions affecting respirator use change, the Program Administrator will evaluate on a case-by-case basis whether QNFT is required.

## Respirator Use

Respiratory protection is required for the following personnel:

<b>TABLE 2: XYZ Seating Personnel in Respiratory Protection Program</b>			
<b>Name</b>	<b>Department</b>	<b>Job Description/ Work Procedure</b>	<b>Respirator</b>
Joe Apple	Prep	Operator	Half mask APR P100 filter when sanding/ SAR continuous flow hood for cleaning
Ron Carey	Maintenance	Dip tank cleaning	SAR, pressure demand with auxiliary SCBA
Lisa Jones	Coating	Spray Booth Operator	SAR, continuous flow hood
.			
.			
.			

### *General Use Procedures:*

- Employees will use their respirators under conditions specified by this program, and in accordance with the training they receive on the use of each particular model. In addition, the respirator shall not be used in a manner for which it is not certified by NIOSH or by its manufacturer.
- All employees shall conduct user seal checks each time that they wear their respirator. Employees shall use either the positive or negative pressure check (depending on which test works best for them) specified in Appendix B-1 of the Respiratory Protection Standard.
- All employees shall be permitted to leave the work area to go to the locker room to maintain their respirator for the following reasons: to clean their respirator if the respirator is impeding their ability to work, change filters or cartridges, replace parts, or to inspect respirator if it stops functioning as intended. Employees should notify their supervisor before leaving the area.

- Employees are not permitted to wear tight-fitting respirators if they have any condition, such as facial scars, facial hair, or missing dentures, that prevents them from achieving a good seal. Employees are not permitted to wear headphones, jewelry, or other articles that may interfere with the facepiece-to-face seal.

### *Emergency Procedures:*

The following work areas have been identified as having foreseeable emergencies:

Spray Booth Cleaning Area - spill of hazardous waste  
Dip Coat Area - malfunction of ventilation system, leak in supply system  
Coatings Storage Area - spill or leak of hazardous substances

When the alarm sounds, employees in the affected department must immediately don their emergency escape respirator, shut down their process equipment, and exit the work area. All other employees must immediately evacuate the building. XYZ Seating's Emergency Action Plan describes these procedures (including proper evacuation routes and rally points) in greater detail.

Emergency escape respirators are located:

Locker #1 in the Spray Booth Area  
Storage cabinet #3 in Dip Coat/Drying Area  
Locker #4 in the Coatings Storage Area

Respiratory protection in these instances is for escape purposes only. XYZ Seating employees are not trained as emergency responders, and are not authorized to act in such a manner.

### *Respirator Malfunction*

#### 1. APR Respirator Malfunction:

For any malfunction of an APR (e.g., such as breakthrough, facepiece leakage, or improperly working valve), the respirator wearer should inform his or her supervisor that the respirator no longer functions as intended, and go to the designated safe area to maintain the respirator. The supervisor must ensure that the employee receives the needed parts to repair the respirator, or is provided with a new respirator.

#### 2. Atmosphere-supplying Respirator Malfunction:

All workers wearing atmosphere-supplying respirators will work with a buddy. Buddies shall assist workers who experience an SAR malfunction as follows:

If a worker in the spray booth experiences a malfunction of an SAR, he or she should signal to the buddy that he or she has had a respirator malfunction. The buddy shall don an emergency escape respirator and aid the worker in immediately exiting the spray booth.

Workers cleaning wood pieces or assembled furniture in the Prep department will work with a buddy. If one of the workers experiences a respirator malfunction, he/she shall signal this to their buddy. The buddy must immediately stop what he or she is doing to escort the employee to the Prep staging area where the employee can safely remove the SAR.

### *IDLH Procedures*

The Program Administrator has identified the following area as presenting the potential for IDLH conditions:

#### *Dip Coat Tank Cleaning:*

Maintenance workers will be periodically required to enter the dip tank to perform scheduled or unscheduled maintenance. In such cases, workers will follow the permit required confined space entry procedures specified in the XYZ Seating Confined Space Program. As specified in these procedures, the Program Administrator has determined that workers entering this area shall wear a pressure demand SAR. In addition, an appropriately trained and equipped standby person shall remain outside the dip tank and maintain constant voice and visual communication with the worker. In the event of an emergency requiring the standby person to enter the IDLH environment, the standby person shall immediately notify the Program Administrator and will proceed with rescue operations in accordance with rescue procedures outlined in the XYZ Seating Confined Space Program.

### **Air Quality**

For supplied-air respirators, only Grade D breathing air shall be used in the cylinders. The Program Administrator will coordinate deliveries of compressed air with the company's vendor, Compressed Air Inc., and require Compressed Air Inc. to certify that the air in the cylinders meets the specifications of Grade D breathing air.

The Program Administrator will maintain a minimum air supply of one fully charged replacement cylinder for each SAR unit. In addition, cylinders may be recharged as necessary from the breathing air cascade system located near the respirator storage area. The air for this

system is provided by XYZ Seating's supplier, and deliveries of new air are coordinated by the Program Administrator.

## **Cleaning, Maintenance, Change Schedules and Storage**

### *Cleaning*

Respirators are to be regularly cleaned and disinfected at the designated respirator cleaning station located in the employee locker room.

Respirators issued for the exclusive use of an employee shall be cleaned as often as necessary, but at least once a day for workers in the Prep and Assembly departments.

Atmosphere supplying and emergency use respirators are to be cleaned and disinfected after each use.

The following procedure is to be used when cleaning and disinfecting respirators:

- Disassemble respirator, removing any filters, canisters, or cartridges.
- Wash the facepiece and associated parts in a mild detergent with warm water. Do not use organic solvents.
- Rinse completely in clean warm water.
- Wipe the respirator with disinfectant wipes (70% Isopropyl Alcohol) to kill germs.
- Air dry in a clean area.
- Reassemble the respirator and replace any defective parts.
- Place in a clean, dry plastic bag or other air tight container.

Note: The Program Administrator will ensure an adequate supply of appropriate cleaning and disinfection material at the cleaning station. If supplies are low, employees should contact their supervisor, who will inform the Program Administrator.

### *Maintenance*

Respirators are to be properly maintained at all times in order to ensure that they function properly and adequately protect the employee. Maintenance involves a thorough visual inspection for cleanliness and defects. Worn or deteriorated parts will be replaced prior to use. No components will be replaced or repairs made beyond those recommended by the manufacturer. Repairs to regulators or alarms of atmosphere-supplying respirators will be conducted by the manufacturer.

The following checklist will be used when inspecting respirators:

- Facepiece:
  - cracks, tears, or holes
  - facemask distortion
  - cracked or loose lenses/faceshield
- Headstraps:
  - breaks or tears
  - broken buckles
- Valves:
  - residue or dirt
  - cracks or tears in valve material
- Filters/Cartridges:
  - approval designation
  - gaskets
  - cracks or dents in housing
  - proper cartridge for hazard
- Air Supply Systems:
  - breathing air quality/grade
  - condition of supply hoses
  - hose connections
  - settings on regulators and valves

Employees are permitted to leave their work area to perform limited maintenance on their respirator in a designated area that is free of respiratory hazards. Situations when this is permitted include to wash their face and respirator facepiece to prevent any eye or skin irritation, to replace the filter, cartridge or canister, and if they detect vapor or gas breakthrough or leakage in the facepiece or if they detect any other damage to the respirator or its components.

#### *Change Schedules*

Employees wearing APRs or PAPRs with P100 filters for protection against wood dust and other particulates shall change the cartridges on their respirators when they first begin to experience difficulty breathing (i.e., resistance) while wearing their masks.

Based on discussions with our respirator distributor about XYZ Seating's workplace exposure conditions, employees voluntarily wearing APRs with organic vapor cartridges shall change the

cartridges on their respirators at the end of each work week to ensure the continued effectiveness of the respirators.

### *Storage*

Respirators must be stored in a clean, dry area, and in accordance with the manufacturer's recommendations. Each employee will clean and inspect their own air-purifying respirator in accordance with the provisions of this program and will store their respirator in a plastic bag in their own locker. Each employee will have his/her name on the bag and that bag will only be used to store that employee's respirator.

Atmosphere supplying respirators will be stored in the storage cabinet outside of the Program Administrator's office.

The Program Administrator will store XYZ's supply of respirators and respirator components in their original manufacturer's packaging in the equipment storage room.

### *Defective Respirators*

Respirators that are defective or have defective parts shall be taken out of service immediately. If, during an inspection, an employee discovers a defect in a respirator, he/she is to bring the defect to the attention of his or her supervisor. Supervisors will give all defective respirators to the Program Administrator. The Program Administrator will decide whether to:

- Temporarily take the respirator out of service until it can be repaired.
- Perform a simple fix on the spot such as replacing a headstrap.
- Dispose of the respirator due to an irreparable problem or defect.

When a respirator is taken out of service for an extended period of time, the respirator will be tagged out of service, and the employee will be given a replacement of similar make, model, and size. All tagged out respirators will be kept in the storage cabinet inside the Program Administrator's office.

### **Training**

The Program Administrator will provide training to respirator users and their supervisors on the contents of the XYZ Seating Respiratory Protection Program and their responsibilities under it, and on the OSHA Respiratory Protection standard. Workers will be trained prior to using a respirator in the workplace. Supervisors will also be trained prior to using a respirator in the workplace or prior to supervising employees that must wear respirators.



The training course will cover the following topics:

- the XYZ Seating Respiratory Protection Program
- the OSHA Respiratory Protection standard
- respiratory hazards encountered at XYZ Seating and their health effects
- proper selection and use of respirators
- limitations of respirators
- respirator donning and user seal (fit) checks
- fit testing
- emergency use procedures
- maintenance and storage
- medical signs and symptoms limiting the effective use of respirators

Employees will be retrained annually or as needed (e.g., if they change departments and need to use a different respirator). Employees must demonstrate their understanding of the topics covered in the training through hands-on exercises and a written test. Respirator training will be documented by the Program Administrator and the documentation will include the type, model, and size of respirator for which each employee has been trained and fit tested.

## **5.0 Program Evaluation**

The Program Administrator will conduct periodic evaluations of the workplace to ensure that the provisions of this program are being implemented. The evaluations will include regular consultations with employees who use respirators and their supervisors, site inspections, air monitoring and a review of records.

Problems identified will be noted in an inspection log and addressed by the Program Administrator. These findings will be reported to XYZ Seating management, and the report will list plans to correct deficiencies in the respirator program and target dates for the implementation of those corrections.

## **6.0 Documentation and Recordkeeping**

A written copy of this program and the OSHA standard is kept in the Program Administrator's office and is available to all employees who wish to review it.

Also maintained in the Program Administrator's office are copies of training and fit test records. These records will be updated as new employees are trained, as existing employees receive refresher training, and as new fit tests are conducted.

The Program Administrator will also maintain copies of the medical records for all employees covered under the respirator program. The completed medical questionnaire and the physician's documented findings are confidential and will remain at ABC Medical Clinic. The company will only retain the physician's written recommendation regarding each employee's ability to wear a respirator.

**TABLE 3: XYZ SEATING HAZARD ASSESSMENT - JUNE 1998**

Department	Contaminants	Exposure Level (8 hrs TWA)*	PEL	Controls
Prep: Sanding	wood dust	2.5 - 7.0 mg/m <sup>3</sup>	5 mg/m <sup>3</sup> (TLV= 1 mg/m <sup>3</sup> )	Local exhaust ventilation (LEV) for sanders. Half-facepiece APR with P100 filter.
Prep: Cleaning	methylene chloride	70 ppm	25 ppm 125 ppm = STEL	LEV to be installed for cleaning stations. Continuous flow SAR hood until then needed for respiratory protection. Will reevaluate after LEV installation.
	methanol	150 ppm	200 ppm	
	acetone	400 ppm	1,000 ppm	
Coating: Spray booth painting	toluene	(300 ppm)**	200 ppm 500 ppm =10 min peak	Continuous flow SAR hood
	xylene	(40 ppm)**	100 ppm 150 ppm = STEL	
	MEK (methyl ethyl ketone)	(25 ppm)**	200 ppm	
	methanol	(20 ppm)**	200 ppm	

Department	Contaminants	Exposure Level (8 hrs TWA)*	PEL	Controls
Coating: Spray booth gun cleaning	toluene	80 ppm (30 min)	200 ppm 500 ppm =10 min peak	Half-facepiece APR with organic vapor cartridge
	methanol	300 (30 min)	200 ppm	
Coating: Dip Coat	toluene	25 ppm	200 ppm 500 ppm =10 min peak	Automated line is vented. Workers may voluntarily wear half-facepiece APR with organic vapor cartridge.
	xylene	50 ppm	100 ppm 150 ppm = STEL	
	MEK	60 ppm	200 ppm	
	MIBK	10 ppm	100 ppm	
	methanol	50 ppm	200 ppm	
Drying (oven)	None (monitoring revealed no significant exposures)	NA	NA	NA

Department	Contaminants	Exposure Level (8 hrs TWA)*	PEL	Controls
Assembly: Sanding, gluing and nailing	wood dust	2.5 -6.0 mg/m <sup>3</sup>	5 mg/m <sup>3</sup> (TLV= 1 mg/m <sup>3</sup> )	aqueous-based glues will be used to eliminate exposures to methylene chloride, formaldehyde and epichlorohydrin
	formaldehyde	1.0 ppm	0.75 ppm 2 ppm = STEL	
	epichlorohydrin	4 ppm	5 ppm	
	methylene chloride	60 ppm	25 ppm 125 ppm = STEL	
Maintenance: Dip tank cleaning	toluene, xylene, MEK, MIBK, methanol	IDLH conditions		SAR, pressure demand with auxiliary SCBA must be worn
Maintenance: Spray booth cleaning/filter change	particulates	1.8 mg/m <sup>3</sup>	5 mg/m <sup>3</sup>	Voluntary use, half-facepiece APR with P100 filter

Department	Contaminants	Exposure Level (8 hrs TWA)*	PEL	Controls
Maintenance: Loading coatings into supply systems	toluene	40 ppm ( 1 hr)	200 ppm 500 ppm =10 min peak	Voluntary use, half-facepiece APR with organic vapor cartridges
	xylene	80 ppm (1 hr)	100 ppm 150 ppm = STEL	
	MEK	100 ppm (1 hr)	200 ppm	
	MIBK	15 ppm (1 hr)	100 ppm	
	methanol	125 ppm (1 hr)	200 ppm	
Warehouse	None	NA	NA	NA

\* Summarized from Industrial Hygiene report provided by ABC Industrial Hygiene Services

\*\* These values were obtained from a survey on average exposures in downdraft spray booths utilized in the furniture coating industry as published in the American Journal of Industrial Hygiene \_\_\_\_\_.



**APPENDIX V**  
**References**



## REFERENCES

***QUESTIONS AND ANSWERS ON THE RESPIRATORY PROTECTION STANDARD*** OSHA PUBLICATION

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AVAILABLE FROM: NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH  
Phone Number: (800-356-4674); Web site: [www.cdc.gov/niosh/homepage.html](http://www.cdc.gov/niosh/homepage.html)



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# **Assigned Protection Factors for the Revised Respiratory Protection Standard**





Employers are responsible for providing a safe and healthy workplace for their employees. OSHA's role is to promote the safety and health of America's working men and women by setting and enforcing standards; providing training, outreach and education; establishing partnerships; and encouraging continual improvement in workplace safety and health.

This publication provides a general overview of a particular standards-related topic. This publication does not alter or determine compliance responsibilities which are set forth in OSHA standards, and the *Occupational Safety and Health Act*. Moreover, because interpretations and enforcement policy may change over time, for additional guidance on OSHA compliance requirements the reader should consult current administrative interpretations and decisions by the Occupational Safety and Health Review Commission and the courts.

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# **Assigned Protection Factors for the Revised Respiratory Protection Standard**

**Occupational Safety and Health Administration  
U.S. Department of Labor**

**OSHA 3352-02  
2009**



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## Introduction

In a final rule on Assigned Protection Factors (APFs), OSHA revised its existing Respiratory Protection standard to add definitions and requirements for APFs and Maximum Use Concentrations (MUCs). (See 63 FR 1152; 29 CFR 1910.134; 71 FR 50122, August 24, 2006.) This guidance document focuses on the mandatory selection provisions of the APFs, MUCs, and Table I<sup>1</sup> at page 14 and their role in the overall Respiratory Protection standard. The provisions can only be used when respirators are properly selected and used in compliance with the full Respiratory Protection standard. The final Respiratory Protection standard (29 CFR 1910.134 and 29 CFR 1926.103) applies to general industry, construction, longshoring, shipyard, and marine terminal workplaces.

The Agency developed the final APFs after thoroughly reviewing the available literature, including workplace protection factor studies, comments submitted to the record, and hearing testimony. The final APFs provide employers with critical information to use when selecting respirators for employees exposed to atmospheric contaminants found in industry. Proper respirator selection is an important component of an effective respiratory protection program. Accordingly, the final APFs are necessary to protect employees who must use respirators to protect them from airborne contaminants.

## The Audience for this Guide

The employer should read this guide if it is likely that you will need to establish and implement a respiratory protection program.

## How to Use this Guide

This guide is divided into sections that correspond to the recently updated respirator selection provisions under section (d) of the Respiratory Protection standard. Specifically, these provisions are (d)(3)(i)(A) and (d)(3)(i)(B). This guide provides information that answers the following questions: What are Assigned Protection Factors (APFs)?; What are Maximum Use Concentrations (MUCs)?; and How to Use APFs and MUCs?

Two attachments are provided. Attachment A is the glossary of the final APF rule; and, Attachment B is the complete final Respiratory Protection standard. The **brown colored type** denotes that the provisions of the final Respiratory Protection standard are being used.

## History

In a final rule on OSHA's Respiratory Protection standard, OSHA reserved the provisions incorporating APFs, MUCs, and the APF Table, for further rulemaking. (See 63 FR 1152; 29 CFR 1910.134; 71 FR 50122, August 24, 2006.) The APF final standard went into effect on November 22, 2006 (71 FR 50122).

OSHA's methodology for assigning protection factors to classes of respirators was twofold: first, OSHA analyzed all the data, and second, OSHA reviewed all the literature. By analyzing all available statistical data and literature, OSHA is assured that the Agency is measuring and observing the outcomes that are of concern to OSHA. That is, OSHA is observing and measuring the outcomes achieved when employers are in compliance with the full Respiratory Protection standard. Thus, OSHA has acted in a rigorous manner in establishing the APFs.

## Assigned Protection Factors (APFs) and Maximum Use Concentrations (MUCs)

The rulemaking on the reserved sections of the Respiratory Protection standard have now been completed (71 FR 50122; August 24, 2006). These cover provisions for APFs and MUCs, as well as Table I.

The definitions of APFs and MUCs are:

**Assigned Protection Factor (APF)** means the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program as specified by this section.

**Maximum Use Concentration (MUC)** means the maximum atmospheric concentration of a hazardous substance from which an employee can be expected to be protected when wearing a respirator, and is determined by the assigned protection factor of the respirator or class of respirators and the exposure limit of the hazardous substance. The MUC usually can be determined mathematically by multiplying the assigned protection factor specified for a respirator by the permissible exposure limit (PEL), short-term exposure limit, ceiling limit, peak limit, or any other exposure limit used for the hazardous substance.

The MUC for respirators is calculated by multiplying the APF for the respirator by the PEL. The MUC is

the upper limit at which the class of respirator is expected to provide protection. Whenever the exposures approach the MUC, then the employer should select the next higher class of respirators for the employees.

Employers must not apply MUCs to conditions that are immediately dangerous to life or health (IDLH); instead, they must use respirators listed for IDLH conditions in paragraph (d)(2) of this standard. When the calculated MUC exceeds the IDLH level for a hazardous substance, or the performance limits of the cartridge or canister, then employers must set the maximum MUC at that lower limit.

### How to use APFs and MUCs

Under the Respiratory Protection standard, APFs and MUCs are used specifically in selecting proper equipment under section (d)(3), which addresses the selection of respiratory protection equipment for non-IDLH atmospheres. In this provision, under (d)(3)(i), employers must provide respirators that are adequate to protect employee health and ensure compliance with all other OSHA requirements under routine, and reasonably foreseeable, emergency situations.

Under paragraph (d)(3)(i)(A), employers must select respirators according to APFs, using Table I: Assigned Protection Factors. Under paragraph (d)(3)(i)(B), employers must select respirators after considering the MUCs in their workplace under which respirators are to be used.

APFs are used to select the appropriate class of respirators that will provide the necessary level of protection. The airborne hazardous exposure can be from a particulate or a gas or vapor. The APF for the class of respirators will remain the same. The APF value can only be applied to a class of respirators when the respirators are properly selected and used in compliance with the Respiratory Protection standard (29 CFR 1910.134), with properly selected filters or canisters, as needed.

The new APF table is on page 14.

Under paragraph (d)(3)(ii), employers must select respirators (using APFs as well) that are appropriate for the chemical state and physical form of the con-

taminant. You need different types of filters, cartridges, and canisters depending on whether dusts, fumes, mists, vapors, or gases are present in your workplace and depending on the kinds and concentrations of the substances present.

Respiratory hazards may be present in the workplace whenever an atmosphere does not contain sufficient oxygen, or if it contains chemical, biological, or radiological contaminants in sufficient quantity to harm the health of employees. Respiratory hazards may be present in the workplace in the following physical forms:

**Dusts and fibers** are solid particles that are formed or generated from solid materials through mechanical processes such as crushing, grinding, drilling, abrading or blasting. Examples are lead, silica, and asbestos.

**Fumes** are solid particles that are formed when a metal or other solid vaporizes and the molecules condense (or solidify) in cool air. Examples are metal fumes from smelting or welding. Fumes also may be formed from processes such as plastic injection or extrusion molding.

**Mists** are tiny droplets of liquid suspended in the air. Examples are oil mist produced from lubricants used in metal cutting operations, acid mists from electroplating, and paint spray mist from spraying operations.

**Gases** are materials that exist as individual molecules in the air at room temperature. Examples are welding gases, such as acetylene and nitrogen, and carbon monoxide produced from internal combustion engines.

**Vapors** are the gaseous form of substances that are normally in the solid or liquid state at room temperature and pressure. They are formed by evaporation. Most solvents produce vapors. Examples include toluene and methylene chloride.

**Biological hazards** include bacteria, viruses, fungi, and other living organisms that are respirable and can cause acute and chronic infections. Examples include Legionnaire's Disease and animal waste products (e.g., feces).

## Major Types of Respirators

*Air-purifying respirators*, which remove contaminants from the air.



**Half mask/Dust mask**  
APF=10  
*Needs to be fit tested*



**Half mask (Elastomeric)**  
APF=10  
*Needs to be fit tested*



**Full facepiece (Elastomeric)**  
APF=50  
*Needs to be fit tested*

Original Illustrations created by Attilis & Associates



**Loose-Fitting Powered  
Air-Purifying Respirator (PAPR)**  
APF= 25



**Hood Powered Air-Purifying  
Respirator (PAPR)**  
APF= 25



**Atmosphere-supplying respirators**, which provide clean air from an uncontaminated source.



**Full Facepiece Supplied-Air Respirator (SAR)  
with an auxiliary Escape Bottle**  
APF=1,000  
APF = 10,000 (if used in “escape” mode)  
*Needs to be fit tested*



**Full Facepiece Abrasive Blasting  
Continuous Flow**  
APF=1,000  
*Needs to be fit tested*



**Full Facepiece Self-Contained  
Breathing Apparatus (SCBA)**  
Pressure demand mode is APF=10,000  
*Needs to be fit tested*

## Attachment A Glossary

At the beginning of the final rule for Assigned Protection Factors (APF), in a separate glossary, there are lists for both acronyms and common terms used throughout the preamble to the final APF rule. (See 63 FR 1152; 29 CFR 1910.134; 71 FR 50122, August 24, 2006). The glossary is provided as an auxiliary list for terms used both in the APF rulemaking as well as throughout the preamble to the APF final rule. This glossary is in addition to the definitions in the APF rulemaking for Assigned Protection Factor and Maximum Use Concentration (MUC). The glossary contains legally defined terms from the final Respiratory Protection standard (29 CFR 1910.134 and 29 CFR 1926.103) each of which is highlighted with an asterisk (\*). The purpose of this glossary and list of acronyms is to provide the terms that have already been defined by the Respiratory Protection standard, in one place, along with the terms from the final APF rule in order to facilitate their use and review.

This glossary specifies the terms represented by acronyms and provides definitions of other terms used frequently in the preamble to the final rule. This glossary does not change the legal requirements in this final rule nor is it intended to impose new regulatory requirements on the regulated community.

### Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
APF	Assigned Protection Factor
APR	Air-purifying respirator
Ci	Concentration measured inside the respirator facepiece
Co	Concentration measured outside the respirator
DOP	Diocetylphthalate (see definition at page 8)
DFM	Dust, fume, and mist filter
EPF	Effective Protection Factor (see definition at page 9)

HEPA	High efficiency particulate air filter (see definition at page 8)
IDLH	Immediately dangerous to life or health (see definition at page 8, and under the Respiratory Protection standard)
LANL	Los Alamos National Laboratory
LASL	Los Alamos Scientific Laboratory
LLNL	Lawrence Livermore National Laboratory
MSHA	Mine Safety and Health Administration
MUC	Maximum Use Concentration
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NRC	Nuclear Regulatory Commission
OSHA	Occupational Safety and Health Administration
OSH Act	Occupational Safety and Health Act of 1970 (29 U.S.C. 655, 657, 665).
PAPR	Powered air-purifying respirator (see definition in the standard below)
PEL	Permissible Exposure Limit
PPF	Program Protection Factor (see definition at page 8)
QLFT	Qualitative fit test (see definition at page 9)
QNFT	Quantitative fit test (see definition at page 9)
RDL	Respirator Decision Logic (see definition at page 9)
REL	Recommended Exposure Limit (see definition at page 9)
SAR	Supplied-air (or airline) respirator (see definition at page 9)
SCBA	Self-contained breathing apparatus (see definition at page 9)
WPF	Workplace Protection Factor (see definition at page 9)
TLV	Threshold Limit Value (see definition at page 9)
SWPF	Simulated Workplace Protection Factor (see definition at page 9)

## Definitions

Terms preceded by an asterisk (\*) refer to definitions that can be found in paragraph (b) (“Definitions”) of OSHA’s Respiratory Protection standard (29 CFR 1910.134).

**\*Air-purifying respirator:** A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

**\*Atmosphere-supplying respirator:** A respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes SARs and SCBA units.

**\*Canister or cartridge:** A container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.

**Continuous flow respirator:** An atmosphere-supplying respirator that provides a continuous flow of breathable air to the respirator facepiece.

**\*Demand respirator:** An atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

**Diethylphthalate (DEHP):** An aerosolized agent used for quantitative fit testing.

**Elastomeric:** A respirator facepiece made of a natural or synthetic elastic material such as natural rubber, silicone, or EPDM rubber.

**\*Filter or air-purifying element:** A component used in respirators to remove solid or liquid aerosols from the inspired air.

**\*Filtering facepiece (or dust mask):** A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

**\*Fit factor:** A quantitative estimate of the fit of a particular respirator to a specific individual and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

**\*Fit test:** The use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual.

**\*Helmet:** A rigid respiratory inlet covering that also provides head protection against impact and penetration.

**\*High efficiency particulate air filter (HEPA):** A filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.

**\*Hood:** A respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.

**\*Immediately dangerous to life or health (IDLH):** An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual’s ability to escape from a dangerous atmosphere.

**\*Loose-fitting facepiece:** A respiratory inlet covering that is designed to form a partial seal with the face.

**\*Negative pressure respirator (tight-fitting):** A respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

**Permissible Exposure Limit (PEL):** An occupational exposure limit specified by OSHA.

**\*Positive pressure respirator:** A respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

**\*Powered air-purifying respirator (PAPR):** An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

**\*Pressure demand respirator:** A positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

**Protection factor study:** A study that determines the protection provided by a respirator during use. This determination generally is accomplished by measuring the ratio of the concentration of an airborne contaminant (e.g., hazardous substance) outside the respirator ( $C_o$ ) to the concentration inside the respirator ( $C_i$ ) (i.e.,  $C_o/C_i$ ). Therefore, as the ratio between  $C_o$  and  $C_i$  increases, the protection factor increases, indicating an increase in the level of protection pro-

vided to employees by the respirator. Four types of protection factor studies are:

**Effective Protection Factor (EPF) study** - a study, conducted in the workplace, that measures the protection provided by a properly selected, fit tested, and functioning respirator when used intermittently for only some fraction of the total workplace exposure time (i.e., sampling is conducted during periods when respirators are worn and not worn). EPFs are not directly comparable to WPF values because the determinations include both the time spent in contaminated atmospheres with and without respiratory protection; therefore, EPFs usually underestimate the protection afforded by a respirator that is used continuously in the workplace.

**Program Protection Factor (PPF) study** - a study that estimates the protection provided by a respirator within a specific respirator program. Like the EPF, it is focused not only on the respirator's performance, but also the effectiveness of the complete respirator program. PPFs are affected by all factors of the program, including respirator selection and maintenance, user training and motivation, work activities, and program administration.

**Workplace Protection Factor (WPF) study** - a study, conducted under actual conditions of use in the workplace, that measures the protection provided by a properly selected, fit tested, and functioning respirator, when the respirator is worn correctly and used as part of a comprehensive respirator program that is in compliance with OSHA's Respiratory Protection standard at 29 CFR 1910.134. Measurements of Co and Ci are obtained only while the respirator is being worn during performance of normal work tasks (i.e., samples are not collected when the respirator is not being worn). As the degree of protection afforded by the respirator increases, the WPF increases.

**Simulated Workplace Protection Factor (SWPF) study** - a study, conducted in a controlled laboratory setting and in which Co and Ci sampling is performed while the respirator user performs a series of set exercises. The laboratory setting is used to control many of the variables found in workplace studies, while the exercises simulate the work activities of respirator users. This type of study is designed to determine the optimum performance of respirators by reducing the impact of sources of variability through maintenance of tightly controlled study conditions.

**\*Qualitative fit test (QLFT):** A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

**\*Quantitative fit test (QNFT):** An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

**Recommended Exposure Limit (REL):** An occupational exposure level recommended by NIOSH.

**Respirator Decision Logic (RDL):** Respirator selection guidance developed by NIOSH that contains a set of respirator protection factors.

**\*Self-contained breathing apparatus (SCBA):** An atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

**\*Supplied-air respirator (or airline) respirator (SAR):** An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

**Threshold Limit Value (TLV):** An occupational exposure level recommended by ACGIH.

**\*Tight-fitting facepiece:** A respiratory inlet covering that forms a complete seal with the face.

## **Attachment B**

### **Regulatory Text of the Respiratory Protection Standard**

1910.134(a)

***Permissible practice.***

1910.134(a)(1)

In the control of those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective shall be to prevent atmospheric contamination. This shall be accomplished as far as feasible by accepted engineering control measures (for example, enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials). When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used pursuant to this section.

1910.134(a)(2)

A respirator shall be provided to each employee when such equipment is necessary to protect the health of such employee. The employer shall provide the respirators which are applicable and suitable for the purpose intended. The employer shall be responsible for the establishment and maintenance of a respiratory protection program, which shall include the requirements outlined in paragraph (c) of this section. The program shall cover each employee required by this section to use a respirator.

1910.134(b)

***Definitions.*** The following definitions are important terms used in the respiratory protection standard in this section.

*Air-purifying respirator* means a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

*Assigned protection factor (APF)* means the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program as specified by this section.

*Atmosphere-supplying respirator* means a respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

*Canister or cartridge* means a container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.

*Demand respirator* means an atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

*Emergency situation* means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

*Employee exposure* means exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection.

*End-of-service-life indicator (ESLI)* means a system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.

*Escape-only respirator* means a respirator intended to be used only for emergency exit.

*Filter or air purifying element* means a component used in respirators to remove solid or liquid aerosols from the

inspired air.

*Filtering facepiece (dust mask)* means a negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

*Fit factor* means a quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

*Fit test* means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also Qualitative fit test QLFT and Quantitative fit test QNFT.)

*Helmet* means a rigid respiratory inlet covering that also provides head protection against impact and penetration.

*High efficiency particulate air (HEPA) filter* means a filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.

*Hood* means a respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.

*Immediately dangerous to life or health (IDLH)* means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

*Interior structural firefighting* means the physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures which are involved in a fire situation beyond the incipient stage. (See 29 CFR 1910.155)

*Loose-fitting facepiece* means a respiratory inlet covering that is designed to form a partial seal with the face.

*Maximum use concentration (MUC)* means the maximum atmospheric concentration of a hazardous substance from which an employee can be expected to be protected when wearing a respirator, and is determined by the assigned protection factor of the respirator or class of respirators and the exposure limit of the hazardous substance. The MUC can be determined mathematically by multiplying the assigned protection factor specified for a respirator by the required OSHA permissible exposure limit, short-term exposure limit, or ceiling limit. When no OSHA exposure limit is available for a hazardous substance, an employer must determine an MUC on the basis of relevant available information and informed professional judgment.

*Negative pressure respirator (tight fitting)* means a respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

*Oxygen deficient atmosphere* means an atmosphere with an oxygen content below 19.5% by volume.

*Physician or other licensed health care professional (PLHCP)* means an individual whose legally permitted scope of 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 paragraph (e) of this section.

*Positive pressure respirator* means a respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

*Powered air-purifying respirator (PAPR)* means an air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

*Pressure demand respirator* means a positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

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

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

*Respiratory inlet covering* means that portion of a respirator that forms the protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both. It may be a facepiece, helmet, hood, suit, or a mouthpiece respirator with nose clamp.

*Self-contained breathing apparatus (SCBA)* means an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

*Service life* means the period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer.

*Supplied-air respirator (SAR) or airline respirator* means an atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

*This section* means this respiratory protection standard.

*Tight-fitting facepiece* means a respiratory inlet covering that forms a complete seal with the face.

*User seal check* means an action conducted by the respirator user to determine if the respirator is properly seated to the face.

1910.134(c)

***Respiratory protection program.*** This paragraph requires the employer to develop and implement a written respiratory protection program with required worksite-specific procedures and elements for required respirator use. The program must be administered by a suitably trained program administrator. In addition, certain program elements may be required for voluntary use to prevent potential hazards associated with the use of the respirator. The Small Entity Compliance Guide contains criteria for the selection of a program administrator and a sample program that meets the requirements of this paragraph. Copies of the Small Entity Compliance Guide will be available on or about April 8, 1998 from the Occupational Safety and Health Administration's Office of Publications, Room N 3101, 200 Constitution Avenue, NW, Washington, DC, 20210 (202-219-4667).

1910.134(c)(1)

In any workplace where respirators are necessary to protect the health of the employee or whenever respirators are required by the employer, the employer shall establish and implement a written respiratory protection program with worksite-specific procedures. The program shall be updated as necessary to reflect those changes in workplace conditions that affect respirator use. The employer shall include in the program the following provisions of this section, as applicable:

1910.134(c)(1)(i)

Procedures for selecting respirators for use in the workplace;

1910.134(c)(1)(ii)

Medical evaluations of employees required to use respirators;

1910.134(c)(1)(iii)

Fit testing procedures for tight-fitting respirators;



1910.134(c)(1)(iv)

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

1910.134(c)(1)(v)

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

1910.134(c)(1)(vi)

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

1910.134(c)(1)(vii)

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

1910.134(c)(1)(viii)

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

1910.134(c)(1)(ix)

Procedures for regularly evaluating the effectiveness of the program.

1910.134(c)(2)

Where respirator use is not required:

1910.134(c)(2)(i)

An employer may provide respirators at the request of employees or permit employees to use their own respirators, if the employer determines that such respirator use will not in itself create a hazard. If the employer determines that any voluntary respirator use is permissible, the employer shall provide the respirator users with the information contained in Appendix D to this section ("Information for Employees Using Respirators When Not Required Under the Standard"); and

1910.134(c)(2)(ii)

In addition, the employer must establish and implement those elements of a written respiratory protection program necessary to ensure that any employee using a respirator voluntarily is medically able 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. Exception: Employers are not required to include in a written respiratory protection program those employees whose only use of respirators involves the voluntary use of filtering facepieces (dust masks).

1910.134(c)(3)

The employer shall designate a program administrator who is qualified by appropriate training or experience that is commensurate with the complexity of the program to administer or oversee the respiratory protection program and conduct the required evaluations of program effectiveness.

1910.134(c)(4)

The employer shall provide respirators, training, and medical evaluations at no cost to the employee.

1910.134(d)

***Selection of respirators.*** This paragraph requires the employer to evaluate respiratory hazard(s) in the workplace, identify relevant workplace and user factors, and base respirator selection on these factors. The paragraph also specifies appropriately protective respirators for use in IDLH atmospheres, and limits the selection and use of air-purifying respirators.

1910.134(d)(1)

*General requirements.*

1910.134(d)(1)(i)

The employer shall select and provide an appropriate respirator based on the respiratory hazard(s) to which the worker is exposed and workplace and user factors that affect respirator performance and reliability.

1910.134(d)(1)(ii)

The employer shall select a NIOSH-certified respirator. The respirator shall be used in compliance with the conditions of its certification.

1910.134(d)(1)(iii)

The employer shall identify and evaluate the respiratory hazard(s) in the workplace; this evaluation shall include a reasonable estimate of employee exposures to respiratory hazard(s) and an identification of the contaminant's chemical state and physical form. Where the employer cannot identify or reasonably estimate the employee exposure, the employer shall consider the atmosphere to be IDLH.

1910.134(d)(1)(iv)

The employer shall select respirators from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

1910.134(d)(2)

*Respirators for IDLH atmospheres.*

1910.134(d)(2)(i)

The employer shall provide the following respirators for employee use in IDLH atmospheres:

1910.134(d)(2)(i)(A)

A full facepiece pressure demand SCBA certified by NIOSH for a minimum service life of thirty minutes, or

1910.134(d)(2)(i)(B)

A combination full facepiece pressure demand supplied-air respirator (SAR) with auxiliary self-contained air supply.

1910.134(d)(2)(ii)

Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

1910.134(d)(2)(iii)

All oxygen-deficient atmospheres shall be considered IDLH. Exception: If the employer demonstrates that, under all foreseeable conditions, the oxygen concentration can be maintained within the ranges specified in Table II of

this section (i.e., for the altitudes set out in the table), then any atmosphere-supplying respirator may be used.

1910.134(d)(3)

*Respirators for atmospheres that are not IDLH.*

1910.134(d)(3)(i)

The employer shall provide a respirator that is adequate to protect the health of the employee and ensure compliance with all other OSHA statutory and regulatory requirements, under routine and reasonably foreseeable emergency situations.

1910.134(d)(3)(i)(A)

*Assigned Protection Factors (APFs)* Employers must use the assigned protection factors listed in Table 1 to select a respirator that meets or exceeds the required level of employee protection. When using a combination respirator (e.g., airline respirators with an air-purifying filter), employers must ensure that the assigned protection factor is appropriate to the mode of operation in which the respirator is being used.

**Table 1. -- Assigned Protection Factors<sup>5</sup>**

Type of respirator <sup>1, 2</sup>	Quarter mask	Half mask	Full facepiece	Helmet/ hood	Loose-fitting facepiece
1. Air-Purifying Respirator	5	<sup>3</sup> 10	50	.....	.....
2. Powered Air-Purifying Respirator (PAPR)	.....	50	1,000	<sup>4</sup> 25/1,000	25
3. Supplied-Air Respirator (SAR) or Airline Respirator					
• Demand mode	.....	10	50	.....	.....
• Continuous flow mode	.....	50	1,000	<sup>4</sup> 25/1,000	25
• Pressure-demand or other positive-pressure mode	.....	50	1,000	.....	.....
4. Self-Contained Breathing Apparatus (SCBA)					
• Demand mode	.....	10	50	50	.....
• Pressure-demand or other positive-pressure mode (e.g., open/closed circuit)	.....	.....	10,000	10,000	.....

Notes:

<sup>1</sup> Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.

<sup>2</sup> The assigned protection factors in Table 1 are only effective when the employer implements a continuing, effective respirator program as required by this section (29 CFR 1910.134), including training, fit testing, maintenance, and use requirements.

<sup>3</sup> This APF category includes filtering facepieces, and half masks with elastomeric facepieces.

<sup>4</sup> The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a WPF or SWPF study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.

<sup>5</sup> These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, employers must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134 (d)(2)(ii).

1910.134(d)(3)(i)(B)

*Maximum Use Concentration (MUC)*

1910.134(d)(3)(i)(B)(1)

The employer must select a respirator for employee use that maintains the employee's exposure to the hazardous substance, when measured outside the respirator, at or below the MUC.

1910.134(d)(3)(i)(B)(2)

Employers must not apply MUCs to conditions that are immediately dangerous to life or health (IDLH); instead, they must use respirators listed for IDLH conditions in paragraph (d)(2) of this standard.

1910.134(d)(3)(i)(B)(3)

When the calculated MUC exceeds the IDLH level for a hazardous substance, or the performance limits of the cartridge or canister, then employers must set the maximum MUC at that lower limit.

1910.134(d)(3)(ii)

The respirator selected shall be appropriate for the chemical state and physical form of the contaminant.

1910.134(d)(3)(iii)

For protection against gases and vapors, the employer shall provide:

1910.134(d)(3)(iii)(A)

An atmosphere-supplying respirator, or

1910.134(d)(3)(iii)(B)

An air-purifying respirator, provided that:

1910.134(d)(3)(iii)(B)(1)

The respirator is equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant; or

1910.134(d)(3)(iii)(B)(2)

If there is no ESLI appropriate for conditions in the employer's workplace, the employer implements a change schedule for canisters and cartridges that is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. The employer shall describe in the respirator program the information and data relied upon and the basis for the canister and cartridge change schedule and the basis for reliance on the data.

1910.134(d)(3)(iv)

For protection against particulates, the employer shall provide:

1910.134(d)(3)(iv)(A)

An atmosphere-supplying respirator; or

1910.134(d)(3)(iv)(B)

An air-purifying respirator equipped with a filter certified by NIOSH under 30 CFR part 11 as a high efficiency particulate air (HEPA) filter, or an air-purifying respirator equipped with a filter certified for particulates by NIOSH under 42 CFR part 84; or

1910.134(d)(3)(iv)(C)

For contaminants consisting primarily of particles with mass median aerodynamic diameters (MMAD) of at least 2 micrometers, an air-purifying respirator equipped with any filter certified for particulates by NIOSH.

TABLE I. -- ASSIGNED PROTECTION FACTORS  
[RESERVED]

TABLE II

Altitude (ft.)	Oxygen deficient Atmospheres (% O <sub>2</sub> ) for which the employer atmosphere may rely on supplying respirators
Less than 3,001	16.0-19.5
3,001-4,000	16.4-19.5
4,001-5,000	17.1-19.5
5,001-6,000	17.8-19.5
6,001-7,000	18.5-19.5
7,001-8,000 <sup>1</sup>	19.3-19.5.

<sup>1</sup>Above 8,000 feet the exception does not apply. Oxygen-enriched breathing air must be supplied above 14,000 feet.

1910.134(e)

**Medical evaluation.** Using a respirator may place a physiological burden on employees that varies with the type of respirator worn, the job and workplace conditions in which the respirator is used, and the medical status of the employee. Accordingly, this paragraph specifies the minimum requirements for medical evaluation that employers must implement to determine the employee's ability to use a respirator.

1910.134(e)(1)

*General.* The employer shall provide a medical evaluation to determine the employee's ability to use a respirator, before the employee is fit tested or required to use the respirator in the workplace. The employer may discontinue an employee's medical evaluations when the employee is no longer required to use a respirator.

1910.134(e)(2)

*Medical evaluation procedures.*

1910.134(e)(2)(i)

The employer shall identify a physician or other licensed health care professional (PLHCP) to perform medical evaluations using a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire.

1910.134(e)(2)(ii)

The medical evaluation shall obtain the information requested by the questionnaire in Sections 1 and 2, Part A of Appendix C of this section.

1910.134(e)(3)

*Follow-up medical examination.*

1910.134(e)(3)(i)

The employer shall ensure that a follow-up medical examination is provided for an employee who gives a positive response to any question among questions 1 through 8 in Section 2, Part A of Appendix C or whose initial medical examination demonstrates the need for a follow-up medical examination.

1910.134(e)(3)(ii)

The follow-up medical examination shall include any medical tests, consultations, or diagnostic procedures that the PLHCP deems necessary to make a final determination.

1910.134(e)(4)

*Administration of the medical questionnaire and examinations.*

1910.134(e)(4)(i)

The medical questionnaire and examinations shall be administered confidentially during the employee's normal working hours or at a time and place convenient to the employee. The medical questionnaire shall be administered in a manner that ensures that the employee understands its content.

1910.134(e)(4)(ii)

The employer shall provide the employee with an opportunity to discuss the questionnaire and examination results with the PLHCP.

1910.134(e)(5)

*Supplemental information for the PLHCP.*

1910.134(e)(5)(i)

The following information must be provided to the PLHCP before the PLHCP makes a recommendation concerning an employee's ability to use a respirator:

1910.134(e)(5)(i)(A)

(A) The type and weight of the respirator to be used by the employee;

1910.134(e)(5)(i)(B)

The duration and frequency of respirator use (including use for rescue and escape);

1910.134(e)(5)(i)(C)

The expected physical work effort;

1910.134(e)(5)(i)(D)

Additional protective clothing and equipment to be worn; and

1910.134(e)(5)(i)(E)

Temperature and humidity extremes that may be encountered.

1910.134(e)(5)(ii)

Any supplemental information provided previously to the PLHCP regarding an employee need not be provided for a subsequent medical evaluation if the information and the PLHCP remain the same.

1910.134(e)(5)(iii)

The employer shall provide the PLHCP with a copy of the written respiratory protection program and a copy of this section.

Note to Paragraph (e)(5)(iii): When the employer replaces a PLHCP, the employer must ensure that the new PLHCP obtains this information, either by providing the documents directly to the PLHCP or having the documents transferred from the former PLHCP to the new PLHCP. However, OSHA does not expect employers to have employees medically reevaluated solely because a new PLHCP has been selected.

1910.134(e)(6)

*Medical determination.* In determining the employee's ability to use a respirator, the employer shall:

1910.134(e)(6)(i)

Obtain a written recommendation regarding the employee's ability to use the respirator from the PLHCP. The recommendation shall provide only the following information:

1910.134(e)(6)(i)(A)

Any limitations on respirator use related to the medical condition of the employee, or relating to the workplace conditions in which the respirator will be used, including whether or not the employee is medically able to use the respirator;

1910.134(e)(6)(i)(B)

The need, if any, for follow-up medical evaluations; and

1910.134(e)(6)(i)(C)

A statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation.

1910.134(e)(6)(ii)

If the respirator is a negative pressure respirator and the PLHCP finds a medical condition that may place the employee's health at increased risk if the respirator is used, the employer shall provide a PAPR if the PLHCP's medical evaluation finds that the employee can use such a respirator; if a subsequent medical evaluation finds that the employee is medically able to use a negative pressure respirator, then the employer is no longer required to provide a PAPR.

1910.134(e)(7)

*Additional medical evaluations.* At a minimum, the employer shall provide additional medical evaluations that comply with the requirements of this section if:

1910.134(e)(7)(i)

An employee reports medical signs or symptoms that are related to ability to use a respirator;

1910.134(e)(7)(ii)

A PLHCP, supervisor, or the respirator program administrator informs the employer that an employee needs to be reevaluated;

1910.134(e)(7)(iii)

Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or

1910.134(e)(7)(iv)

A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

1910.134(f)

**Fit testing.** This paragraph requires that, before an employee may be required to use any respirator with a negative or positive pressure tight-fitting facepiece, the employee must be fit tested with the same make, model, style, and size of respirator that will be used. This paragraph specifies the kinds of fit tests allowed, the procedures for conducting them, and how the results of the fit tests must be used.

1910.134(f)(1)

The employer shall ensure that employees using a tight-fitting facepiece respirator pass an appropriate qualitative fit test (QLFT) or quantitative fit test (QNFT) as stated in this paragraph.

1910.134(f)(2)

The employer shall ensure that an employee using a tight-fitting facepiece respirator is fit tested prior to initial use of the respirator, whenever a different respirator facepiece (size, style, model or make) is used, and at least annually thereafter.

1910.134(f)(3)

The employer shall conduct an additional fit test whenever the employee reports, or the employer, PLHCP, supervisor, or program administrator makes visual observations of, changes in the employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.

1910.134(f)(4)

If after passing a QLFT or QNFT, the employee subsequently notifies the employer, program administrator, supervisor, or PLHCP that the fit of the respirator is unacceptable, the employee shall be given a reasonable opportunity to select a different respirator facepiece and to be retested.

1910.134(f)(5)

The fit test shall be administered using an OSHA-accepted QLFT or QNFT protocol. The OSHA-accepted QLFT and QNFT protocols and procedures are contained in Appendix A of this section.

1910.134(f)(6)

QLFT may only be used to fit test negative pressure air-purifying respirators that must achieve a fit factor of 100 or less.

1910.134(f)(7)

If the fit factor, as determined through an OSHA-accepted QNFT protocol, is equal to or greater than 100 for tight-fitting half facepieces, or equal to or greater than 500 for tight-fitting full facepieces, the QNFT has been



passed with that respirator.

1910.134(f)(8)

Fit testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators shall be accomplished by performing quantitative or qualitative fit testing in the negative pressure mode, regardless of the mode of operation (negative or positive pressure) that is used for respiratory protection.

1910.134(f)(8)(i)

Qualitative fit testing of these respirators shall be accomplished by temporarily converting the respirator user's actual facepiece into a negative pressure respirator with appropriate filters, or by using an identical negative pressure air-purifying respirator facepiece with the same sealing surfaces as a surrogate for the atmosphere-supplying or powered air-purifying respirator facepiece.

1910.134(f)(8)(ii)

Quantitative fit testing of these respirators shall be accomplished by modifying the facepiece to allow sampling inside the facepiece in the breathing zone of the user, midway between the nose and mouth. This requirement shall be accomplished by installing a permanent sampling probe onto a surrogate facepiece, or by using a sampling adapter designed to temporarily provide a means of sampling air from inside the facepiece.

1910.134(f)(8)(iii)

Any modifications to the respirator facepiece for fit testing shall be completely removed, and the facepiece restored to NIOSH-approved configuration, before that facepiece can be used in the workplace.

1910.134(g)

***Use of respirators.*** This paragraph requires employers to establish and implement procedures for the proper use of respirators. These requirements include prohibiting conditions that may result in facepiece seal leakage, preventing employees from removing respirators in hazardous environments, taking actions to ensure continued effective respirator operation throughout the work shift, and establishing procedures for the use of respirators in IDLH atmospheres or in interior structural firefighting situations.

1910.134(g)(1)

*Facepiece seal protection.*

1910.134(g)(1)(i)

The employer shall not permit respirators with tight-fitting facepieces to be worn by employees who have:

1910.134(g)(1)(i)(A)

Facial hair that comes between the sealing surface of the facepiece and the face or that interferes with valve function; or

1910.134(g)(1)(i)(B)

Any condition that interferes with the face-to-facepiece seal or valve function.

1910.134(g)(1)(ii)

If an employee wears corrective glasses or goggles or other personal protective equipment, the employer shall ensure that such equipment is worn in a manner that does not interfere with the seal of the facepiece to the face of the user.

1910.134(g)(1)(iii)

For all tight-fitting respirators, the employer shall ensure that employees perform a user seal check each time they put on the respirator using the procedures in Appendix B-1 or procedures recommended by the respirator manufacturer that the employer demonstrates are as effective as those in Appendix B-1 of this section.

1910.134(g)(2)

*Continuing respirator effectiveness.*

1910.134(g)(2)(i)

Appropriate surveillance shall be maintained of work area conditions and degree of employee exposure or stress. When there is a change in work area conditions or degree of employee exposure or stress that may affect respirator effectiveness, the employer shall reevaluate the continued effectiveness of the respirator.

1910.134(g)(2)(ii)

The employer shall ensure that employees leave the respirator use area:

1910.134(g)(2)(ii)(A)

To wash their faces and respirator facepieces as necessary to prevent eye or skin irritation associated with respirator use; or

1910.134(g)(2)(ii)(B)

If they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece; or

1910.134(g)(2)(ii)(C)

To replace the respirator or the filter, cartridge, or canister elements.

1910.134(g)(2)(iii)

If the employee detects vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece, the employer must replace or repair the respirator before allowing the employee to return to the work area.

1910.134(g)(3)

*Procedures for IDLH atmospheres.* For all IDLH atmospheres, the employer shall ensure that:

1910.134(g)(3)(i)

One employee or, when needed, more than one employee is located outside the IDLH atmosphere;

1910.134(g)(3)(ii)

Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere;

1910.134(g)(3)(iii)

The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue;

1910.134(g)(3)(iv)

The employer or designee is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue;

1910.134(g)(3)(v)

The employer or designee authorized to do so by the employer, once notified, provides necessary assistance appropriate to the situation;

1910.134(g)(3)(vi)

Employee(s) located outside the IDLH atmospheres are equipped with:

1910.134(g)(3)(vi)(A)

Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either

1910.134(g)(3)(vi)(B)

Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry; or

1910.134(g)(3)(vi)(C)

Equivalent means for rescue where retrieval equipment is not required under paragraph (g)(3)(vi)(B).

1910.134(g)(4)

*Procedures for interior structural firefighting.* In addition to the requirements set forth under paragraph (g)(3), in interior structural fires, the employer shall ensure that:

1910.134(g)(4)(i)

At least two employees enter the IDLH atmosphere and remain in visual or voice contact with one another at all times;

1910.134(g)(4)(ii)

At least two employees are located outside the IDLH atmosphere; and

1910.134(g)(4)(iii)

All employees engaged in interior structural firefighting use SCBAs.

Note 1 to paragraph (g): One of the two individuals located outside the IDLH atmosphere may be assigned to an additional role, such as incident commander in charge of the emergency or safety officer, so long as this individual is able to perform assistance or rescue activities without jeopardizing the safety or health of any firefighter working at the incident.

Note 2 to paragraph (g): Nothing in this section is meant to preclude firefighters from performing emergency rescue activities before an entire team has assembled.

1910.134(h)

***Maintenance and care of respirators.*** This paragraph requires the employer to provide for the cleaning and disinfecting, storage, inspection, and repair of respirators used by employees.

1910.134(h)(1)

*Cleaning and disinfecting.* The employer shall provide each respirator user with a respirator that is clean, sanitary, and in good working order. The employer shall ensure that respirators are cleaned and disinfected using the procedures in Appendix B-2 of this section, or procedures recommended by the respirator manufacturer, provided that such procedures are of equivalent effectiveness. The respirators shall be cleaned and disinfected at the following intervals:

1910.134(h)(1)(i)

Respirators issued for the exclusive use of an employee shall be cleaned and disinfected as often as necessary to be maintained in a sanitary condition;

1910.134(h)(1)(ii)

Respirators issued to more than one employee shall be cleaned and disinfected before being worn by different individuals;

1910.134(h)(1)(iii)

Respirators maintained for emergency use shall be cleaned and disinfected after each use; and  
1910.134(h)(1)(iv)

Respirators used in fit testing and training shall be cleaned and disinfected after each use.

1910.134(h)(2)

*Storage.* The employer shall ensure that respirators are stored as follows:

1910.134(h)(2)(i)

All respirators shall be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals, and they shall be packed or stored to prevent deformation of the facepiece and exhalation valve.

1910.134(h)(2)(ii)

In addition to the requirements of paragraph (h)(2)(i) of this section, emergency respirators shall be:

1910.134(h)(2)(ii)(A)

Kept accessible to the work area;

1910.134(h)(2)(ii)(B)

Stored in compartments or in covers that are clearly marked as containing emergency respirators; and

1910.134(h)(2)(ii)(C)

Stored in accordance with any applicable manufacturer instructions.

1910.134(h)(3)

*Inspection.*

1910.134(h)(3)(i)

The employer shall ensure that respirators are inspected as follows:

1910.134(h)(3)(i)(A)

All respirators used in routine situations shall be inspected before each use and during cleaning;

1910.134(h)(3)(i)(B)

All respirators maintained for use in emergency situations shall be inspected at least monthly and in accordance with the manufacturer's recommendations, and shall be checked for proper function before and after each use; and

1910.134(h)(3)(i)(C)

Emergency escape-only respirators shall be inspected before being carried into the workplace for use.

1910.134(h)(3)(ii)

The employer shall ensure that respirator inspections include the following:

1910.134(h)(3)(ii)(A)

A check of respirator function, tightness of connections, and the condition of the various parts including, but not limited to, the facepiece, head straps, valves, connecting tube, and cartridges, canisters or filters; and

1910.134(h)(3)(ii)(B)

A check of elastomeric parts for pliability and signs of deterioration.

1910.134(h)(3)(iii)

In addition to the requirements of paragraphs (h)(3)(i) and (ii) of this section, self-contained breathing apparatus shall be inspected monthly. Air and oxygen cylinders shall be maintained in a fully charged state and shall be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level. The employer shall determine that the regulator and warning devices function properly.

1910.134(h)(3)(iv)

For respirators maintained for emergency use, the employer shall:

1910.134(h)(3)(iv)(A)

Certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator; and

1910.134(h)(3)(iv)(B)

Provide this information on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in inspection reports stored as paper or electronic files. This information shall be maintained until replaced following a subsequent certification.

1910.134(h)(4)

*Repairs.* The employer shall ensure that respirators that fail an inspection or are otherwise found to be defective are removed from service, and are discarded or repaired or adjusted in accordance with the following procedures:

1910.134(h)(4)(i)

Repairs or adjustments to respirators are to be made only by persons appropriately trained to perform such operations and shall use only the respirator manufacturer's NIOSH-approved parts designed for the respirator;

1910.134(h)(4)(ii)

Repairs shall be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed; and

1910.134(h)(4)(iii)

Reducing and admission valves, regulators, and alarms shall be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

1910.134(i)

***Breathing air quality and use.*** This paragraph requires the employer to provide employees using atmosphere-supplying respirators (supplied-air and SCBA) with breathing gases of high purity.

1910.134(i)(1)

The employer shall ensure that compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration accords with the following specifications:

1910.134(i)(1)(i)

Compressed and liquid oxygen shall meet the United States Pharmacopoeia requirements for medical or breathing oxygen; and

1910.134(i)(1)(ii)

Compressed breathing air shall meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989, to include:

1910.134(i)(1)(ii)(A)

Oxygen content (v/v) of 19.5-23.5%;

1910.134(i)(1)(ii)(B)

Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;

1910.134(i)(1)(ii)(C)

Carbon monoxide (CO) content of 10 ppm or less;

1910.134(i)(1)(ii)(D)

Carbon dioxide content of 1,000 ppm or less; and

1910.134(i)(1)(ii)(E)

Lack of noticeable odor.

1910.134(i)(2)

The employer shall ensure that compressed oxygen is not used in atmosphere-supplying respirators that have previously used compressed air.

1910.134(i)(3)

The employer shall ensure that oxygen concentrations greater than 23.5% are used only in equipment designed for oxygen service or distribution.

1910.134(i)(4)

The employer shall ensure that cylinders used to supply breathing air to respirators meet the following requirements:

1910.134(i)(4)(i)

Cylinders are tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR part 180);

1910.134(i)(4)(ii)

Cylinders of purchased breathing air have a certificate of analysis from the supplier that the breathing air meets the requirements for Grade D breathing air; and

1910.134(i)(4)(iii)

The moisture content in the cylinder does not exceed a dew point of -50 deg.F (-45.6 deg.C) at 1 atmosphere pressure.

1910.134(i)(5)

The employer shall ensure that compressors used to supply breathing air to respirators are constructed and situated so as to:

1910.134(i)(5)(i)

Prevent entry of contaminated air into the air-supply system;

1910.134(i)(5)(ii)

Minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F (5.56 deg.C) below the ambient temperature;

1910.134(i)(5)(iii)

Have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters shall be maintained and replaced or refurbished periodically following the manufacturer's instructions.

1910.134(i)(5)(iv)

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 shall be maintained at the compressor.

1910.134(i)(6)

For compressors that are not oil-lubricated, the employer shall ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm.

1910.134(i)(7)

For oil-lubricated compressors, the employer shall use a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.

1910.134(i)(8)

The employer shall ensure that breathing air couplings are incompatible with outlets for nonrespirable worksite air or other gas systems. No asphyxiating substance shall be introduced into breathing air lines.

1910.134(i)(9)

The employer shall use only the respirator manufacturer's NIOSH-approved breathing-gas containers, marked and maintained in accordance with the Quality Assurance provisions of the NIOSH approval for the SCBA as issued in accordance with the NIOSH respirator-certification standard at 42 CFR part 84.

1910.134(j)

**Identification of filters, cartridges, and canisters.** The employer shall ensure that all filters, cartridges and canisters used in the workplace are labeled and color coded with the NIOSH approval label and that the label is not removed and remains legible.

1910.134(k)

**Training and information.** This paragraph requires the employer to provide effective training to employees who are required to use respirators. The training must be comprehensive, understandable, and recur annually, and more often if necessary. This paragraph also requires the employer to provide the basic information on respirators in Appendix D of this section to employees who wear respirators when not required by this section or by the employer to do so.

1910.134(k)(1)

The employer shall ensure that each employee can demonstrate knowledge of at least the following:

1910.134(k)(1)(i)

Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator;

1910.134(k)(1)(ii)

What the limitations and capabilities of the respirator are;

1910.134(k)(1)(iii)

How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions;

1910.134(k)(1)(iv)

How to inspect, put on and remove, use, and check the seals of the respirator;

1910.134(k)(1)(v)

What the procedures are for maintenance and storage of the respirator;



1910.134(k)(1)(vi)

How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators; and  
1910.134(k)(1)(vii)

The general requirements of this section.

1910.134(k)(2)

The training shall be conducted in a manner that is understandable to the employee.

1910.134(k)(3)

The employer shall provide the training prior to requiring the employee to use a respirator in the workplace.

1910.134(k)(4)

An employer who is able to demonstrate that a new employee has received training within the last 12 months that addresses the elements specified in paragraph (k)(1)(i) through (vii) is not required to repeat such training provided that, as required by paragraph (k)(1), the employee can demonstrate knowledge of those element(s). Previous training not repeated initially by the employer must be provided no later than 12 months from the date of the previous training.

1910.134(k)(5)

Retraining shall be administered annually, and when the following situations occur:

1910.134(k)(5)(i)

Changes in the workplace or the type of respirator render previous training obsolete;

1910.134(k)(5)(ii)

Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill; or

1910.134(k)(5)(iii)

Any other situation arises in which retraining appears necessary to ensure safe respirator use.

1910.134(k)(6)

The basic advisory information on respirators, as presented in Appendix D of this section, shall be provided by the employer in any written or oral format, to employees who wear respirators when such use is not required by this section or by the employer.

1910.134(l)

**Program evaluation.** This section requires the employer to conduct evaluations of the workplace to ensure that the written respiratory protection program is being properly implemented, and to consult employees to ensure that they are using the respirators properly.

1910.134(l)(1)

The employer shall conduct evaluations of the workplace as necessary to ensure that the provisions of the current written program are being effectively implemented and that it continues to be effective.

1910.134(l)(2)

The employer shall regularly consult employees required to use respirators to assess the employees' views on program effectiveness and to identify any problems. Any problems that are identified during this assessment shall be corrected. Factors to be assessed include, but are not limited to:

1910.134(l)(2)(i)

Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);

1910.134(l)(2)(ii)

Appropriate respirator selection for the hazards to which the employee is exposed;

1910.134(l)(2)(iii)

Proper respirator use under the workplace conditions the employee encounters; and

1910.134(l)(2)(iv)

Proper respirator maintenance.

1910.134(m)

**Recordkeeping.** This section requires the employer to establish and retain written information regarding medical evaluations, fit testing, and the respirator program. This information will facilitate employee involvement in the respirator program, assist the employer in auditing the adequacy of the program, and provide a record for compliance determinations by OSHA.

1910.134(m)(1)

*Medical evaluation.* Records of medical evaluations required by this section must be retained and made available in accordance with 29 CFR 1910.1020.

1910.134(m)(2)

*Fit testing.*

1910.134(m)(2)(i)

The employer shall establish a record of the qualitative and quantitative fit tests administered to an employee including:

1910.134(m)(2)(i)(A)

The name or identification of the employee tested;

1910.134(m)(2)(i)(B)

Type of fit test performed;

1910.134(m)(2)(i)(C)

Specific make, model, style, and size of respirator tested;

1910.134(m)(2)(i)(D)

Date of test; and

1910.134(m)(2)(i)(E)

The pass/fail results for QLFTs or the fit factor and strip chart recording or other recording of the test results for QNFTs.

1910.134(m)(2)(ii)

Fit test records shall be retained for respirator users until the next fit test is administered.

1910.134(m)(3)

A written copy of the current respirator program shall be retained by the employer.

1910.134(m)(4)

Written materials required to be retained under this paragraph shall be made available upon request to affected employees and to the Assistant Secretary or designee for examination and copying.

1910.134(n)

**Effective date.** Paragraphs (d)(3)(i)(A) and (d)(3)(i)(B) of this section become effective November 22, 2006.

1910.134(o)

Appendices. Compliance with Appendix A, Appendix B-1, Appendix B-2, Appendix C, and Appendix D to this section are mandatory.

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## **Appendix A to § 1910.134: Fit Testing Procedures (Mandatory)**

### *Part I. OSHA-Accepted Fit Test Protocols*

#### A. Fit Testing Procedures -- General Requirements

The employer shall conduct fit testing using the following procedures. The requirements in this appendix apply to all OSHA-accepted fit test methods, both QLFT and QNFT.

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.
2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.
3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.
4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.
5. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.
6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:
  - (a) Position of the mask on the nose
  - (b) Room for eye protection
  - (c) Room to talk
  - (d) Position of mask on face and cheeks
7. The following criteria shall be used to help determine the adequacy of the respirator fit:
  - (a) Chin properly placed;
  - (b) Adequate strap tension, not overly tightened;
  - (c) Fit across nose bridge;
  - (d) Respirator of proper size to span distance from nose to chin;
  - (e) Tendency of respirator to slip;
  - (f) Self-observation in mirror to evaluate fit and respirator position.
8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks

described in Appendix B-1 of this section or those recommended by the respirator manufacturer which provide equivalent protection to the procedures in Appendix B-1. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.

9. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.

10. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties.

11. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.

12. Exercise regimen. Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

13. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which could interfere with respirator fit.

14. Test Exercises.

(a) Employers must perform the following test exercises for all fit testing methods prescribed in this appendix, except for the CNP quantitative fit testing protocol and the CNP REDON quantitative fit testing protocol. For these two protocols, employers must ensure that the test subjects (*i.e.*, employees) perform the exercise procedure specified in Part I.C.4(b) of this appendix for the CNP quantitative fit testing protocol, or the exercise procedure described in Part I.C.5(b) of this appendix for the CNP REDON quantitative fit-testing protocol. For the remaining fit testing methods, employers must ensure that employees perform the test exercises in the appropriate test environment in the following manner:

(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.

(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.

(3) Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.

(4) Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (*i.e.*, when looking toward the ceiling).

(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

#### *Rainbow Passage*

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end.

People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

(6) Grimace. The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT)

(7) Bending over. The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.

(8) Normal breathing. Same as exercise (1).

(b) Each test exercise shall be performed for one minute except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

### *B. Qualitative Fit Test (QLFT) Protocols*

#### 1. General

(a) The employer shall ensure that persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

#### 2. Isoamyl Acetate Protocol

Note: This protocol is not appropriate to use for the fit testing of particulate respirators. If used to fit test particulate respirators, the respirator must be equipped with an organic vapor filter.

##### (a) Odor Threshold Screening

Odor threshold screening, performed without wearing a respirator, is intended to determine if the individual tested can detect the odor of isoamyl acetate at low levels.

(1) Three 1 liter glass jars with metal lids are required.

(2) Odor-free water (e.g., distilled or spring water) at approximately 25 deg. C (77 deg. F) shall be used for the solutions.

(3) The isoamyl acetate (IAA) (also known as isopentyl acetate) stock solution is prepared by adding 1 ml of pure IAA to 800 ml of odor-free water in a 1 liter jar, closing the lid and shaking for 30 seconds. A new solution shall be prepared at least weekly.

(4) The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well-ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.

(5) The odor test solution is prepared in a second jar by placing 0.4 ml of the stock solution into 500 ml of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only one day.

- (6) A test blank shall be prepared in a third jar by adding 500 cc of odor-free water.
- (7) The odor test and test blank jar lids shall be labeled (e.g., 1 and 2) for jar identification. Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.
- (8) The following instruction shall be typed on a card and placed on the table in front of the two test jars (i.e., 1 and 2): "The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil."
- (9) The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.
- (10) If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.
- (11) If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.

(b) Isoamyl Acetate Fit Test

- (1) The fit test chamber shall be a clear 55-gallon drum liner suspended inverted over a 2-foot diameter frame so that the top of the chamber is about 6 inches above the test subject's head. If no drum liner is available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.
- (2) Each respirator used for the fitting and fit testing shall be equipped with organic vapor cartridges or offer protection against organic vapors.
- (3) After selecting, donning, and properly adjusting a respirator, the test subject shall wear it to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well-ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.
- (4) A copy of the test exercises and any prepared text from which the subject is to read shall be taped to the inside of the test chamber.
- (5) Upon entering the test chamber, the test subject shall be given a 6-inch by 5-inch piece of paper towel, or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 ml of pure IAA. The test subject shall hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampule may be substituted for the IAA wetted paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that generated by the paper towel method.
- (6) Allow two minutes for the IAA test concentration to stabilize before starting the fit test exercises. This would be an appropriate time to talk with the test subject; to explain the fit test, the importance of his/her cooperation, and the purpose for the test exercises; or to demonstrate some of the exercises.
- (7) If at any time during the test, the subject detects the banana-like odor of IAA, the test is failed. The subject shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.
- (8) If the test is failed, the subject shall return to the selection room and remove the respirator. The test subject shall repeat the odor sensitivity test, select and put on another respirator, return to the test area and again begin the fit test procedure described in (b) (1) through (7) above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the subject shall wait at least 5 minutes before retesting. Odor sensitivity will usually have returned by this time.

(9) If the subject passes the test, the efficiency of the test procedure shall be demonstrated by having the subject break the respirator face seal and take a breath before exiting the chamber.

(10) When the test subject leaves the chamber, the subject shall remove the saturated towel and return it to the person conducting the test, so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealing plastic bag to keep the test area from being contaminated.

### 3. Saccharin Solution Aerosol Protocol

The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Taste threshold screening. The saccharin taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of saccharin.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches in diameter by 14 inches tall with at least the front portion clear and that allows free movements of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a 3/4-inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his/her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a sweet taste.

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. The nozzle is directed away from the nose and mouth of the person. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The threshold check solution is prepared by dissolving 0.83 gram of sodium saccharin USP in 100 ml of warm water. It can be prepared by putting 1 ml of the fit test solution (see (b)(5) below) in 100 ml of distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then released and allowed to fully expand.

(7) Ten squeezes are repeated rapidly and then the test subject is asked whether the saccharin can be tasted. If the test subject reports tasting the sweet taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the saccharin is not tasted after 30 squeezes (step 10), the test subject is unable to taste saccharin and may not perform the saccharin fit test.



Note to paragraph 3. (a): If the test subject eats or drinks something sweet before the screening test, he/she may be unable to taste the weak saccharin solution.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Saccharin solution aerosol fit test procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure described in 3. (a) above.

(3) The test subject shall don the enclosure while wearing the respirator selected in section I. A. of this appendix. The respirator shall be properly adjusted and equipped with a particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 83 grams of sodium saccharin to 100 ml of warm water.

(6) As before, the test subject shall breathe through the slightly open mouth with tongue extended, and report if he/she tastes the sweet taste of saccharin.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of saccharin fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test. A minimum of 10 squeezes is required.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the original number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of saccharin is detected. If the test subject does not report tasting the saccharin, the test is passed.

(11) If the taste of saccharin is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

(12) Since the nebulizer has a tendency to clog during use, the test operator must make periodic checks of the nebulizer to ensure that it is not clogged. If clogging is found at the end of the test session, the test is invalid.

#### 4. Bitrex™ (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol

The Bitrex™ (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. Bitrex is routinely used as a taste aversion agent in household liquids which children should not be drinking and is endorsed by the American Medical Association, the National Safety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Taste Threshold Screening.

The Bitrex taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of Bitrex.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches (30.5 cm) in diameter by 14 inches (35.6 cm) tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a  $\frac{3}{4}$  inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a bitter taste

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the Threshold Check Solution into the enclosure. This Nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The Threshold Check Solution is prepared by adding 13.5 milligrams of Bitrex to 100 ml of 5% salt (NaCl) solution in distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely, and is then released and allowed to fully expand.

(7) An initial ten squeezes are repeated rapidly and then the test subject is asked whether the Bitrex can be tasted. If the test subject reports tasting the bitter taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the Bitrex is not tasted after 30 squeezes (step 10), the test subject is unable to taste Bitrex and may not perform the Bitrex fit test.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Bitrex Solution Aerosol Fit Test Procedure.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

- (2) The fit test uses the same enclosure as that described in 4. (a) above.
  - (3) The test subject shall don the enclosure while wearing the respirator selected according to section I. A. of this appendix. The respirator shall be properly adjusted and equipped with any type particulate filter(s).
  - (4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.
  - (5) The fit test solution is prepared by adding 337.5 mg of Bitrex to 200 ml of a 5% salt (NaCl) solution in warm water.
  - (6) As before, the test subject shall breathe through his or her slightly open mouth with tongue extended, and be instructed to report if he/she tastes the bitter taste of Bitrex.
  - (7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test.
  - (8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.
  - (9) Every 30 seconds the aerosol concentration shall be replenished using one half the number of squeezes used initially (e.g., 5, 10 or 15).
  - (10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of Bitrex is detected. If the test subject does not report tasting the Bitrex, the test is passed.
  - (11) If the taste of Bitrex is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).
5. Irritant Smoke (Stannic Chloride) Protocol

This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

(a) General Requirements and Precautions

- (1) The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).
- (2) Only stannic chloride smoke tubes shall be used for this protocol.
- (3) No form of test enclosure or hood for the test subject shall be used.
- (4) The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.
- (5) The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

(b) Sensitivity Screening Check

The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

- (1) The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach

one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

(2) The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.

(3) The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.

#### (c) Irritant Smoke Fit Test Procedure

(1) The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).

(2) The test subject shall be instructed to keep his/her eyes closed.

(3) The test operator shall direct the stream of irritant smoke from the smoke tube toward the faceseal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.

(4) If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.

(5) The exercises identified in section I.A. 14. of this appendix shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

(6) If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

(7) Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.

(8) If a response is produced during this second sensitivity check, then the fit test is passed.

#### C. Quantitative Fit Test (QNFT) Protocols

The following quantitative fit testing procedures have been demonstrated to be acceptable: Quantitative fit testing using a non-hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; Quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; Quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

##### 1. General

(a) The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

## 2. Generated Aerosol Quantitative Fit Testing Protocol

### (a) Apparatus.

- (1) Instrumentation. Aerosol generation, dilution, and measurement systems using particulates (corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS] or sodium chloride) as test aerosols shall be used for quantitative fit testing.
- (2) Test chamber. The test chamber shall be large enough to permit all test subjects to perform freely all required exercises without disturbing the test agent concentration or the measurement apparatus. The test chamber shall be equipped and constructed so that the test agent is effectively isolated from the ambient air, yet uniform in concentration throughout the chamber.
- (3) When testing air-purifying respirators, the normal filter or cartridge element shall be replaced with a high efficiency particulate air (HEPA) or P100 series filter supplied by the same manufacturer.
- (4) The sampling instrument shall be selected so that a computer record or strip chart record may be made of the test showing the rise and fall of the test agent concentration with each inspiration and expiration at fit factors of at least 2,000. Integrators or computers that integrate the amount of test agent penetration leakage into the respirator for each exercise may be used provided a record of the readings is made.
- (5) The combination of substitute air-purifying elements, test agent and test agent concentration shall be such that the test subject is not exposed in excess of an established exposure limit for the test agent at any time during the testing process, based upon the length of the exposure and the exposure limit duration.
- (6) The sampling port on the test specimen respirator shall be placed and constructed so that no leakage occurs around the port (e.g., where the respirator is probed), a free air flow is allowed into the sampling line at all times, and there is no interference with the fit or performance of the respirator. The in-mask sampling device (probe) shall be designed and used so that the air sample is drawn from the breathing zone of the test subject, midway between the nose and mouth and with the probe extending into the facepiece cavity at least 1/4 inch.
- (7) The test setup shall permit the person administering the test to observe the test subject inside the chamber during the test.
- (8) The equipment generating the test atmosphere shall maintain the concentration of test agent constant to within a 10 percent variation for the duration of the test.
- (9) The time lag (interval between an event and the recording of the event on the strip chart or computer or integrator) shall be kept to a minimum. There shall be a clear association between the occurrence of an event and its being recorded.
- (10) The sampling line tubing for the test chamber atmosphere and for the respirator sampling port shall be of equal diameter and of the same material. The length of the two lines shall be equal.
- (11) The exhaust flow from the test chamber shall pass through an appropriate filter (i.e., high efficiency particulate filter) before release.
- (12) When sodium chloride aerosol is used, the relative humidity inside the test chamber shall not exceed 50 percent.
- (13) The limitations of instrument detection shall be taken into account when determining the fit factor.
- (14) Test respirators shall be maintained in proper working order and be inspected regularly for deficiencies such

as cracks or missing valves and gaskets.

(b) Procedural Requirements.

(1) When performing the initial user seal check using a positive or negative pressure check, the sampling line shall be crimped closed in order to avoid air pressure leakage during either of these pressure checks.

(2) The use of an abbreviated screening QLFT test is optional. Such a test may be utilized in order to quickly identify poor fitting respirators that passed the positive and/or negative pressure test and reduce the amount of QNFT time. The use of the CNC QNFT instrument in the count mode is another optional method to obtain a quick estimate of fit and eliminate poor fitting respirators before going on to perform a full QNFT.

(3) A reasonably stable test agent concentration shall be measured in the test chamber prior to testing. For canopy or shower curtain types of test units, the determination of the test agent's stability may be established after the test subject has entered the test environment.

(4) Immediately after the subject enters the test chamber, the test agent concentration inside the respirator shall be measured to ensure that the peak penetration does not exceed 5 percent for a half mask or 1 percent for a full facepiece respirator.

(5) A stable test agent concentration shall be obtained prior to the actual start of testing.

(6) Respirator restraining straps shall not be over-tightened for testing. The straps shall be adjusted by the wearer without assistance from other persons to give a reasonably comfortable fit typical of normal use. The respirator shall not be adjusted once the fit test exercises begin.

(7) The test shall be terminated whenever any single peak penetration exceeds 5 percent for half masks and 1 percent for full facepiece respirators. The test subject shall be refitted and retested.

(8) Calculation of fit factors.

(i) The fit factor shall be determined for the quantitative fit test by taking the ratio of the average chamber concentration to the concentration measured inside the respirator for each test exercise except the grimace exercise.

(ii) The average test chamber concentration shall be calculated as the arithmetic average of the concentration measured before and after each test (i.e., 7 exercises) or the arithmetic average of the concentration measured before and after each exercise or the true average measured continuously during the respirator sample.

(iii) The concentration of the challenge agent inside the respirator shall be determined by one of the following methods:

*(A)* Average peak penetration method means the method of determining test agent penetration into the respirator utilizing a strip chart recorder, integrator, or computer. The agent penetration is determined by an average of the peak heights on the graph or by computer integration, for each exercise except the grimace exercise. Integrators or computers that calculate the actual test agent penetration into the respirator for each exercise will also be considered to meet the requirements of the average peak penetration method.

*(B)* Maximum peak penetration method means the method of determining test agent penetration in the respirator as determined by strip chart recordings of the test. The highest peak penetration for a given exercise is taken to be representative of average penetration into the respirator for that exercise.

*(C)* Integration by calculation of the area under the individual peak for each exercise except the grimace exercise. This includes computerized integration.

*(D)* The calculation of the overall fit factor using individual exercise fit factors involves first converting the

exercise fit factors to penetration values, determining the average, and then converting that result back to a fit factor. This procedure is described in the following equation:

$$\text{Overall Fit Factor} = \frac{\text{Number of exercises}}{1/ff_1 + 1/ff_2 + 1/ff_3 + 1/ff_4 + 1/ff_5 + 1/ff_6 + 1/ff_7 + 1/ff_8}$$

Where  $ff_1, ff_2, ff_3$ , etc. are the fit factors for exercises 1, 2, 3, etc.

(9) The test subject shall not be permitted to wear a half mask or quarter facepiece respirator unless a minimum fit factor of 100 is obtained, or a full facepiece respirator unless a minimum fit factor of 500 is obtained.

(10) Filters used for quantitative fit testing shall be replaced whenever increased breathing resistance is encountered, or when the test agent has altered the integrity of the filter media.

### 3. Ambient aerosol condensation nuclei counter (CNC) quantitative fit testing protocol.

The ambient aerosol condensation nuclei counter (CNC) quantitative fit testing (Portacount™) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator, that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

#### (a) Portacount Fit Test Requirements.

(1) Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 series 100, series 99, or series 95 particulate filter) per manufacturer's instruction.

(2) Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.

(3) Check the following conditions for the adequacy of the respirator fit: Chin properly placed; Adequate strap tension, not overly tightened; Fit across nose bridge; Respirator of proper size to span distance from nose to chin; Tendency of the respirator to slip; Self-observation in a mirror to evaluate fit and respirator position.

(4) Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting facepiece, try another size of the same model respirator, or another model of respirator.

(5) Follow the manufacturer's instructions for operating the Portacount and proceed with the test.

(6) The test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(7) After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

(b) Portacount Test Instrument.

- (1) The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.
- (2) Since the pass or fail criterion of the Portacount is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance in this Appendix.
- (3) A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

4. Controlled negative pressure (CNP) quantitative fit testing protocol.

The CNP protocol provides an alternative to aerosol fit test methods. The CNP fit test method technology is based on exhausting air from a temporarily sealed respirator facepiece to generate and then maintain a constant negative pressure inside the facepiece. The rate of air exhaust is controlled so that a constant negative pressure is maintained in the respirator during the fit test. The level of pressure is selected to replicate the mean inspiratory pressure that causes leakage into the respirator under normal use conditions. With pressure held constant, air flow out of the respirator is equal to air flow into the respirator. Therefore, measurement of the exhaust stream that is required to hold the pressure in the temporarily sealed respirator constant yields a direct measure of leakage air flow into the respirator. The CNP fit test method measures leak rates through the facepiece as a method for determining the facepiece fit for negative pressure respirators. The CNP instrument manufacturer Occupational Health Dynamics of Birmingham, Alabama also provides attachments (sampling manifolds) that replace the filter cartridges to permit fit testing in an employee's own respirator. To perform the test, the test subject closes his or her mouth and holds his/her breath, after which an air pump removes air from the respirator facepiece at a pre-selected constant pressure. The facepiece fit is expressed as the leak rate through the facepiece, expressed as milliliters per minute. The quality and validity of the CNP fit tests are determined by the degree to which the in-mask pressure tracks the test pressure during the system measurement time of approximately five seconds. Instantaneous feedback in the form of a real-time pressure trace of the in-mask pressure is provided and used to determine test validity and quality. A minimum fit factor pass level of 100 is necessary for a half-mask respirator and a minimum fit factor of at least 500 is required for a full facepiece respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) CNP Fit Test Requirements.

- (1) The instrument shall have a non-adjustable test pressure of 15.0 mm water pressure.
- (2) The CNP system defaults selected for test pressure shall be set at -- 15 mm of water (-0.58 inches of water) and the modeled inspiratory flow rate shall be 53.8 liters per minute for performing fit tests.

(Note: CNP systems have built-in capability to conduct fit testing that is specific to unique work rate, mask, and gender situations that might apply in a specific workplace. Use of system default values, which were selected to represent respirator wear with medium cartridge resistance at a low-moderate work rate, will allow inter-test comparison of the respirator fit.)

- (3) The individual who conducts the CNP fit testing shall be thoroughly trained to perform the test.
- (4) The respirator filter or cartridge needs to be replaced with the CNP test manifold. The inhalation valve downstream from the manifold either needs to be temporarily removed or propped open.
- (5) The employer must train the test subject to hold his or her breath for at least 10 seconds.
- (6) The test subject must don the test respirator without any assistance from the test administrator who is conducting the CNP fit test. The respirator must not be adjusted once the fit-test exercises begin. Any adjustment



voids the test, and the test subject must repeat the fit test.

(7) The QNFT protocol shall be followed according to section I. C. 1. of this appendix with an exception for the CNP test exercises.

(b) CNP Test Exercises.

(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject needs to hold head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply for 1 minute, being careful not to hyperventilate. After the deep breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during test measurement.

(3) Turning head side to side. Standing in place, the subject shall slowly turn his or her head from side to side between the extreme positions on each side for 1 minute. The head shall be held at each extreme momentarily so the subject can inhale at each side. After the turning head side to side exercise, the subject needs to hold head full left and hold his or her breath for 10 seconds during test measurement. Next, the subject needs to hold head full right and hold his or her breath for 10 seconds during test measurement.

(4) Moving head up and down. Standing in place, the subject shall slowly move his or her head up and down for 1 minute. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling). After the moving head up and down exercise, the subject shall hold his or her head full up and hold his or her breath for 10 seconds during test measurement. Next, the subject shall hold his or her head full down and hold his or her breath for 10 seconds during test measurement.

(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song for 1 minute. After the talking exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(6) Grimace. The test subject shall grimace by smiling or frowning for 15 seconds.

(7) Bending Over. The test subject shall bend at the waist as if he or she were to touch his or her toes for 1 minute. Jogging in place shall be substituted for this exercise in those test environments such as shroud-type QNFT units that prohibit bending at the waist. After the bending over exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(8) Normal Breathing. The test subject shall remove and re-don the respirator within a one-minute period. Then, in a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of a respirator shall be tried.

(c) CNP Test Instrument.

(1) The test instrument must have an effective audio-warning device, or a visual-warning device in the form of a screen tracing, that indicates when the test subject fails to hold his or her breath during the test. The test must be terminated and restarted from the beginning when the test subject fails to hold his or her breath during the test. The test subject then may be refitted and retested.

(2) A record of the test shall be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style and size of respirator used; and date tested.

5. Controlled negative pressure (CNP) REDON quantitative fit testing protocol.

(a) When administering this protocol to test subjects, employers must comply with the requirements specified in paragraphs (a) and (c) of Part I.C.4 of this appendix ("Controlled negative pressure (CNP) quantitative fit testing protocol"), as well as use the test exercises described below in paragraph (b) of this protocol instead of the test exercises specified in paragraph (b) of Part I.C.4 of this appendix.

(b) Employers must ensure that each test subject being fit tested using this protocol follows the exercise and measurement procedures, including the order of administration, described below in Table A-1 of this appendix.

Table A-1. -- CNP REDON Quantitative Fit Testing Protocol

Exercises <sup>(1)</sup>	Exercise procedure	Measurement procedure
Facing Forward	Stand and breathe normally, without talking, for 30 seconds.	Face forward, while holding breath for 10 seconds.
Bending Over	Bend at the waist, as if going to touch his or her toes, for 30 seconds.	Face parallel to the floor, while holding breath for 10 seconds
Head Shaking	For about three seconds, shake head back and forth vigorously several times while shouting.	Face forward, while holding breath for 10 seconds.
REDON 1	Remove the respirator mask, loosen all facepiece straps, and then redon the respirator mask.	Face forward, while holding breath for 10 seconds.
REDON 2	Remove the respirator mask, loosen all facepiece straps, and then redon the respirator mask again.	Face forward, while holding breath for 10 seconds.

<sup>1</sup> Exercises are listed in the order in which they are to be administered.

(c) After completing the test exercises, the test administrator must question each test subject regarding the comfort of the respirator. When a test subject states that the respirator is unacceptable, the employer must ensure that the test administrator repeats the protocol using another respirator model.

(d) Employers must determine the overall fit factor for each test subject by calculating the harmonic mean of the fit testing exercises as follows:

$$\text{Overall Fit Factor} = \frac{N}{\left[ \frac{1}{FF_1} + \frac{1}{FF_2} + \dots + \frac{1}{FF_N} \right]}$$

Where:

N = The number of exercises;

FF1 = The fit factor for the first exercise;

FF2 = The fit factor for the second exercise; and

FFN = The fit factor for the nth exercise.

*Part II. New Fit Test Protocols*

A. Any person may submit to OSHA an application for approval of a new fit test protocol. If the application meets the following criteria, OSHA will initiate a rulemaking proceeding under section 6(b)(7) of the OSH Act to determine whether to list the new protocol as an approved protocol in this Appendix A.

B. The application must include a detailed description of the proposed new fit test protocol. This application must be supported by either:

1. A test report prepared by an independent government research laboratory (e.g., Lawrence Livermore National Laboratory, Los Alamos National Laboratory, the National Institute for Standards and Technology) stating that the laboratory has tested the protocol and had found it to be accurate and reliable; or

2. An article that has been published in a peer-reviewed industrial hygiene journal describing the protocol and explaining how test data support the protocol's accuracy and reliability.

C. If OSHA determines that additional information is required before the Agency commences a rulemaking proceeding under this section, OSHA will so notify the applicant and afford the applicant the opportunity to submit the supplemental information. Initiation of a rulemaking proceeding will be deferred until OSHA has received and evaluated the supplemental information.

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[63 FR 20098, April 23, 1998; 69 FR 46993, August 4, 2004]

## **Appendix B-1 to § 1910.134: User Seal Check Procedures (Mandatory)**

The individual who uses a tight-fitting respirator is to perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed in this appendix, or the respirator manufacturer's recommended user seal check method shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

### *I. Facepiece Positive and/or Negative Pressure Checks*

*A. Positive pressure check.* Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

*B. Negative pressure check.* Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

### *II. Manufacturer's Recommended User Seal Check Procedures*

The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures provided that the employer demonstrates that the manufacturer's procedures are equally effective.

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[63 FR 1152, Jan. 8, 1998]

## **Appendix B-2 to § 1910.134: Respirator Cleaning Procedures (Mandatory)**

These procedures are provided for employer use when cleaning respirators. They are general in nature, and the employer as an alternative may use the cleaning recommendations provided by the manufacturer of the respirators used by their employees, provided such procedures are as effective as those listed here in Appendix B- 2. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth in Appendix B-2, i.e., must ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

### *I. Procedures for Cleaning Respirators*

- A. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure- demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.
- B. Wash components in warm (43 deg. C [110 deg. F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
- C. Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain.
- D. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:
  - 1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43 deg. C (110 deg. F); or,
  - 2. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43 deg. C (110 deg. F); or,
  - 3. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.
- E. Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
- F. Components should be hand-dried with a clean lint-free cloth or air-dried.
- G. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.
- H. Test the respirator to ensure that all components work properly.

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[63 FR 1152, Jan. 8, 1998]

**Appendix C to Sec. 1910.134: OSHA Respirator Medical Evaluation Questionnaire (Mandatory)**

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 (circle one): Yes/No

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the 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 (circle one): Male/Female
5. Your height: \_\_\_\_\_ ft. \_\_\_\_\_ in.
6. Your weight: \_\_\_\_\_ lbs.
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 (circle one): 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, non-cartridge type only).
  - b. \_\_\_\_\_ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).
12. Have you worn a respirator (circle one): 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: 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 (heart beating irregularly): 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
  - d. 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-facepiece 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: Yes/No

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: Yes/No

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. Climbing a flight of stairs or a ladder carrying more than 25 lbs: Yes/No

j. Any other muscle or skeletal problem that interferes with using a respirator: Yes/No

Part B Any of the following questions, and other questions not listed, 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 at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you 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 (for example, 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 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 HAZMAT 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. HEPA Filters: Yes/No

b. Canisters (for example, 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 5 hours *per week*: Yes/No

d. Less than 2 hours *per day*: Yes/No

e. 2 to 4 hours per day: Yes/No

f. Over 4 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: \_\_\_\_\_ hrs. \_\_\_\_\_ mins.

Examples of a light work effort are *sitting* while writing, typing, drafting, or performing light assembly work; or *standing* while operating a drill press (1-3 lbs.) 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: \_\_\_\_\_ hrs. \_\_\_\_\_ mins.

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 lbs.) at trunk level; *walking* on a level surface about 2 mph or down a 5-degree grade about 3 mph; or *pushing* a wheelbarrow with a heavy load (about 100 lbs.) 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: \_\_\_\_\_ hrs. \_\_\_\_\_ mins.

Examples of heavy work are *lifting* a heavy load (about 50 lbs.) 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; climbing stairs with a heavy load (about 50 lbs.).

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 deg. 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) (for example, confined spaces, life-threatening gases):

\_\_\_\_\_  
\_\_\_\_\_

18. Provide the following information, if you know it, for each toxic substance that 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 that you'll 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 (for example, rescue, security):

\_\_\_\_\_  
\_\_\_\_\_

[63 FR 1152, Jan. 8, 1998; 63 FR 20098, April 23, 1998; 76 FR 33607, June 8, 2011]

## **Appendix D to Sec. 1910.134 (Mandatory) 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 that the respirator itself does not present a hazard.

You should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health 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 that you do not mistakenly use someone else's respirator.

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[63 FR 1152, Jan. 8, 1998; 63 FR 20098, April 23, 1998]