

Respiratory protection guidelines

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This publication provides practical workplace safety and health information to assist you in making your place of work safer. It is not legal advice. SAIF has made every effort to bring significant Oregon Occupational Safety and Health Administration (Oregon OSHA) regulations to your attention. Nonetheless, compliance with Oregon OSHA remains your responsibility. You should read and understand all relevant Oregon OSHA regulations that apply to your job site(s). You may want to consult with your own attorney regarding aspects of Oregon OSHA that may affect you.

Note: The information in this publication is time sensitive. Do not rely upon this document if its publication date is more than three years old. Please check the "Safety and health" section of our web site at saif.com/safetyandhealth for a more recent, printable copy. You'll also find a variety of other valuable safety information designed to help your business prevent injuries and control costs.

Written respirator program

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. The program should be updated when necessary to reflect changes in workplace conditions that affect respirator use. The program must designate a qualified program administrator to oversee the program, and should include site-specific company policies and procedures for:

- Selecting respirators for use in the workplace
- Medical evaluations of employees required to use respirators
- Fit-testing procedures for all required-use respirators
- Procedures for proper use of respirators in routine and emergency situations
- Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators
- Procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators
- Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations
- Training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance
- Procedures for regularly evaluating the effectiveness of the program

The program should be available for review by employees who wear respirators. An example program is attached in Appendix B for your assistance.

Hazard evaluation and respirator selection

Respirators are selected based on the type and degree of respiratory hazard. Different respirators are needed for different types of hazards. Things to consider when selecting a respirator are:

- Nature of the work process or operation
- Evaluation of the type of respiratory hazard, including physical properties, oxygen deficiency, toxicity, concentration, exposure limits, and Immediately Dangerous to Life or Health (IDLH) conditions
- Location of the hazardous atmosphere
- Time period for which protection is needed
- Activity level of the workers
- Physical and functional characteristics of the respirator
- Respirator protection factors
- Regulatory requirements

Where an exposure cannot be identified or reasonably estimated, the atmosphere has to be considered IDLH. IDLH conditions require:

- A full facepiece, pressure demand, self-contained breathing apparatus (SCBA) certified by NIOSH for a minimum service life of 30 minutes or;
- A combination full facepiece, pressure demand, supplied-air respirator (SAR) with auxiliary self-contained air supply
- **All oxygen-deficient atmospheres must be considered IDLH**, unless the employer can demonstrate under all foreseeable conditions the oxygen concentration can be maintained within the ranges specified in the table below for the given altitudes. If this can be done, then any atmosphere- supplying respirator can be used.

Table 1: Oxygen-deficient atmospheres for which the employer may rely on atmosphere-supplying respirators*

| Altitude (ft) | Percent O ₂ |
|-----------------|------------------------|
| 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 | 19.3 - 19.5 |

*Above 8,000 feet the exception does not apply. Oxygen-enriched breathing air must be supplied above 14,000 feet.

Because exposures to contaminants will vary, not only in terms of the physical state of the material (dust, vapor, liquid, gas) but also in the material’s toxicity and the way the material is used, it is important to select the proper respirator. Concentration of the contaminant in air will also affect respirator selection. The assigned protection factor is a measure of the degree of protection provided by the respirator and is determined by comparing the concentration of air contaminant in a test environment to that inside the respirator facepiece.

Assigned protection factors (APF) have been established by OSHA, and these factors are to be used to select the respirator that meets or exceeds the required level of employee protection. Appendix D contains Table 1 of the OSHA Publication 3352-02 2009: *Assigned Protection Factors for the Revised Respiratory Protection Standard*. This table provides a quick reference to the APFs. Please refer to the document for the full text and additional information.

Only respirators approved by the National Institute for Occupational Safety and Health (NIOSH) should be used. The NIOSH approval should be for the use intended. A NIOSH approval will be noted on the respirator, cartridges, filters, and other parts.

In addition to NIOSH approval, respirators in health care environments may require Food and Drug Administration (FDA) clearance for infection control when used in patient care. Refer to SAIF Guideline S-911, *Dodging the Bugs: Infection Control at Work* and the Center for Disease Control (CDC) publication, *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents In Healthcare Settings – 2007* for additional information.

Respirators are of two main types:

- Air-purifying
- Air-supplying

Air-purifying respirators use chemical or mechanical filter cartridges to clean the contaminated air before the wearer breathes it in. Air-supplying respirators provide the wearer with uncontaminated breathing air, by use of an air compressor, tank, or cylinder.

Within each major category, there are several types of devices, each of which is appropriate for different uses.

Air-purifying respirators

Canisters or cartridges, for gases and vapors, on **air-purifying respirators must have an end-of-service life indicator (ESLI)** certified by NIOSH for the contaminant; or

If there is no ESLI appropriate for conditions in your workplace, then you must **implement a change schedule** for canisters or cartridges that is based on objective information or data that will ensure that canisters are changed before the end of their service life. You should include in your program the information and data relied upon and the basis for the canister/cartridge change schedule and the basis for reliance on the data. Many manufacturers can provide data that will help you with this aspect of your program.

1. Filtering facepiece particulate respirators/cartridges

These respirators are available as disposable “dust masks,” and as filter and prefilter cartridges for use with half and full-face respirators. All filtering facepieces may not provide protection against the same types or amounts of materials. Respirator filters are certified according to their efficiency. Old-style, high-efficiency particulate air (HEPA) filters are now termed N100, R100, and P100 under 42 CFR 84.

Filters are now certified under 42 CFR 84 in the following manner:

Table 2: Efficiency and use for facepiece particulate respirators/cartridges

| Category | Efficiency (%) | Use |
|----------|----------------|--|
| N95 | 95 | Solid and water based particles only (<u>N</u> ot oil resistant) |
| N99 | 99 | Solid and water based particles only (<u>N</u> ot oil resistant) |
| N100 | 99.97 | Solid and water based particles only (<u>N</u> ot oil resistant) |
| R95 | 95 | Any particulate one shift only for oily particulates (Oil <u>R</u> esistant) |
| R99 | 99 | Any particulate one shift only for oily particulates (Oil <u>R</u> esistant) |
| R100 | 99.97 | Any particulate one shift only for oily particulates (Oil <u>R</u> esistant) |

| | | |
|------|-------|-----------------------------|
| P95 | 95 | Any Particulate (Oil Proof) |
| P99 | 99 | Any Particulate (Oil Proof) |
| P100 | 99.97 | Any Particulate (Oil Proof) |

Remember: N = not oil resistant; R = oil resistant for specific period of time; P = oil proof

Special pesticide and paint spray prefilters, to be used in conjunction with chemical cartridges, are also available. Always read the manufacturer's label for the correct application.

These respirators **do not** protect against gases, vapors, or oxygen-deficient atmospheres.

In health care, N-95 respirators with FDA clearance do not have exhalation valves. Appendix C provides a comparison of different respirators used in healthcare.

2. Chemical cartridge respirators

These are half- or full-facepiece respirators which have chemical cartridges. They may be used for a variety of chemical exposures, for which different cartridges are available. Full-face respirators should be used when the eyes and skin also need protection.

The most commonly used chemical cartridge is the organic vapor cartridge, used for solvent vapor exposures. Other cartridges are available for acid gases, formaldehyde, and ammonia, as well as other chemicals.

The maximum airborne concentration for which the cartridge is designed is specified by the manufacturer and is listed on the cartridge label. Chemical cartridges can be combined or used with particulate filters to provide protection against more than one contaminant. These respirators are not to be used when:

- The only air contaminant is a particulate.
- Working in confined spaces, IDLH, or oxygen deficient atmospheres
- Chemicals for which cartridges cannot be used safely (e.g., isocyanates, hydrogen sulfide, etc.)
- There is not a NIOSH-approved cartridge for the air contaminant or for the contaminant at the concentrations found.

These types of respirators would be appropriate for usage when:

- Spraying paints that evaporate and give off vapors (organic vapor cartridge paint spray prefilter)
- Applying a phenol-formaldehyde glue on a plywood production line (formaldehyde cartridge)
- Using acid solutions to etch glass (acid gas cartridge)

3. Powered air-purifying respirators (PAPRs)

PAPRs are a style of respirator that uses an electrically powered pump to draw air through a filter pack and then deliver clean air to the respirator's facepiece. These respirators may be either half- or full-face, but hood and helmet models are also available. Different types of filter and chemical cartridge packs are available. Some models are designed to attach to pieces of equipment and have a hood or face piece used by the wearer; these are typically worn by pesticide applicators.

These types of respirators would be appropriate for usage when:

- A proper filter or cartridge is available for the contaminant.
- Higher concentrations of contaminant exposure occur.
- Full-face and head exposures may be harmful, such as with pesticide spraying or chemicals which are skin irritants.
- Additional comfort is needed due to extended respirator wearing.

4. Canister respirators (gas masks)

Canister respirators work on the same principle as chemical cartridge respirators, but generally have full-face pieces, and the canister can protect against higher levels of contaminants.

These types of respirators would be appropriate for usage:

- In emergency escape situations (i.e., highly volatile fumigants)
- When the exposures are high, but levels are known

Air-supplying respirators

1. Supplied air respirators

These respirators deliver air to a half- or full-face piece, or hood and helmet, by means of an airline hose. The air, which must be Grade D breathing quality, can come from a large, compressed air cylinder or an air compressor located in an uncontaminated area. Supplied air respirators may be of continuous flow, demand, or pressure-demand types. Continuous flow and pressure demand types maintain a positive pressure in the respiratory inlet covering and, therefore, are less likely to allow inward leakage of air contaminants.

These systems provide a high level of protection, but the airline hose does limit mobility. Airline-supplied air respirators cannot be used in atmospheres classified as IDLH unless a five-minute reserve air bottle is attached for the worker to use for escape purposes if the primary air supply fails.

If air compressors are used, the inlet must be placed in an area with clean, breathable air at all times. The compressor must be equipped with special inlet and outlet filters. Air supplied by compressor or from cylinders must meet certain standards. For specific information, see OSHA 1910.134 (i), Breathing Air Quality & Use.

Supplied air systems will not remove carbon monoxide, toxic gases, or other contaminants from incoming air. The air supplied is the air which the worker will breathe.

These types of respirators would be appropriate for usage when:

- Spray painting with isocyanate-containing paints, which have poor warning properties and are not well controlled with air purifying respirators
- Sandblasting (with special abrasive-blasting hoods and clothing)

2. Self-contained breathing apparatus (SCBAs)

These respirators come equipped with a full-face piece, hose, and cylinder of air, which is worn on the back. These systems provide complete respiratory protection against toxic gases and oxygen-deficient atmospheres. These units are commonly worn by firefighters who must enter areas where atmospheric contaminants may be highly toxic and concentrations are not known. SCBAs do have a limited use-life of about 30 minutes per cylinder of air.

SCBAs can be very heavy and bulky. The weight may impose an extra physical burden on an employee who is already performing strenuous physical exertion. Keep in mind that individuals in poor physical condition, or with certain medical problems, may be unable to work safely in SCBAs. Employees should be medically evaluated prior to wearing respirators.

SCBA use requires additional employee training. Specialized maintenance procedures are also necessary.

These types of respirators would be appropriate for usage when:

- Entrance is needed into a fire area or emergency spill area for containment and clean up.
- Work operations involve exposure to highly toxic materials (such as fumigation with methyl bromide in an enclosed area).

Medical considerations for respirator wearers

Employers must 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 must **identify a physician or otherwise 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 in Appendix C to 1910.134, OSHA Respirator Medical Evaluation Questionnaire (Mandatory).

The questionnaire and examinations should be administered confidentially (e.g., with a sealable envelope or by the PLHCP) during the employee's normal working hours or at a time and place convenient to the employee. The questionnaire must be administered in a manner that ensures that the employee understands its content. The employer also must provide the employee with an opportunity to discuss the questionnaire and examination results with the PLHCP. The following is a list of information that should be provided to the PLHCP before he/she makes a recommendation concerning an employee's ability to wear a respirator:

- Type and weight of the respirator to be used by the employee
- Duration and frequency of respirator use (including rescue and escape)
- Expected physical work effort
- Additional protective clothing and equipment to be worn
- Temperature and humidity extremes that may be encountered

- A copy of the worksite respiratory protection program and a copy of the medical evaluation section of the code

The employer must ensure that a follow-up examination is provided for an employee who gives a positive response to any question among questions 1-8 in Section 2 of the questionnaire or whose initial medical examination demonstrates the need for a follow-up examination. The examination will include any procedures that the PLHCP deems necessary to make a final determination.

Employers should **obtain a written recommendation** regarding the employee's ability to use the respirator from the PLHCP. The recommendation should provide only the following information:

- The need, if any, for follow-up medical evaluations; and
- A statement that the PLHCP has provided the employee a copy of the PLHCP's written recommendation

What happens if the PLHCP determines that using a negative pressure respirator may place the employee's health at increased risk? Employers must provide a PAPR-type respirator if the physician determines that the employee can use such a respirator.

Additional medical evaluations are necessary when:

- An employee reports medical signs or symptoms that are related to his/her ability to wear a respirator.
- A PLHCP, supervisor, or program administrator informs the employer that an employee needs to be reevaluated.
- Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee re-evaluation.
- A change 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.

Employee medical evaluation records should be kept confidential and maintained in accordance with 1910.1020, Access to Employee Exposure and Medical Records.

Employers and physicians considering employees for routine or emergency respirator use should consider that:

1. There may be increased breathing resistance with some types of respirators. This means that the wearer may have to work harder at breathing. Breathing resistance will vary with the type of respirator, type of cartridge, and even between brands of respirators.
2. There may be an increased cardiovascular workload for the wearer. This is especially true if Self-contained Breathing Apparatus (SCBA) units, which weigh about 35 pounds, are needed for a job that is already strenuous.
3. Respirators reduce the field of vision, decrease voice clarity, and may decrease the ability to hear. This can result in decreased overall industrial safety. In addition, some individuals find that wearing respirators produces claustrophobia.

Respirator fit testing

Respirator fit is extremely important. Respirator fit testing is a formal procedure to test how well the tight-fitting respirator facepiece seals against the face. If there is not a good face-to-facepiece seal, the contaminants may pass around the facepiece and be breathed into the lungs.

All employees using a **negative or positive pressure tight-fitting facepiece** respirator must pass an appropriate **qualitative fit test (QLFT) or quantitative fit test (QNFT)**. Fit testing is required prior to initial use, whenever a different respirator facepiece is used, and at least annually thereafter. An additional fit test is required whenever the employee reports, or the employer or physician or otherwise licensed health care professional makes visual observations of changes in the employee's physical condition that could affect respirator fit (e.g., facial scarring, dental changes, surgery, or an obvious change in body weight). Respirators should not be issued or worn if the wearer has facial hair (beards or stubble). Glasses may interfere with fit; using a full facepiece with a spectacle insert can solve this problem. Never allow employees to cut off respirator straps, leave the straps off, or wear them loosely.

Fit tests should be administered using one of the seven OSHA-approved methods listed below. Keep in mind that qualitative methods are designed to detect fit factors of 100. This assures the respirator will provide acceptable protection up to 10 times the PEL. Full facepiece respirators, however, must demonstrate fit factors of at least 500 to assure protection up to 50 times the PEL. Since qualitative fit testing cannot detect fit factors this high, full facepiece respirators that are tested using a qualitative method must not be used in conditions over 10 times the PEL, the same as for half-face respirators.

QLFT protocols:

- Isoamyl acetate
- Saccharin
- Bitrex
- Irritant smoke

QNFT protocols:

- Generated Aerosol (corn oil)
- Condensation Nuclei Counter (PortaCount)
- Controlled Negative Pressure (Dynatech Fit Tester)

OSHA fit-test protocols are specific and should be followed closely. Once you have chosen the fit-test method you will use, follow the applicable protocol listed in Appendix A to 1910.134, Fit Testing Procedures (Mandatory).

Negative and positive pressure user seal checks

Each time a respirator is put on, the wearer must conduct a user seal check to ensure that the respirator is seated correctly against the face.

Either a positive pressure check, negative pressure check, or the manufacturer's recommended procedure should be used. These methods are explained in Appendix B-1 to 1910.134, User Seal Check Procedures (Mandatory).

Training respirator wearers

A respiratory protection training program should be administered prior to employee respirator use and be effective, comprehensive, and understandable. Training should allow the respirator user the opportunity to handle the respirator and wear it in normal air before it is worn in the actual work setting. Demonstrations and hands-on practice with the respirators are essential for good training. You must ensure that each employee can **demonstrate knowledge** of the following:

- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator
- What the limitations and capabilities of the respirator are
- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions
- How to inspect, put on, and remove, use, and check the seals of the respirator
- How to maintain and store the respirator
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators
- The general requirements of 1910.134

Retraining must be done annually and when changes render previous training obsolete, inadequacies in the employee's knowledge are evident, and in any other situation in which retraining appears necessary. When voluntary use of respirators occurs, information in Appendix D of the code should be used for training.

Proper respirator storage and maintenance

Respirators should be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals. They also must be stored so that the facepiece and/or the exhalation valve do not become warped or distorted. Emergency respirators must be:

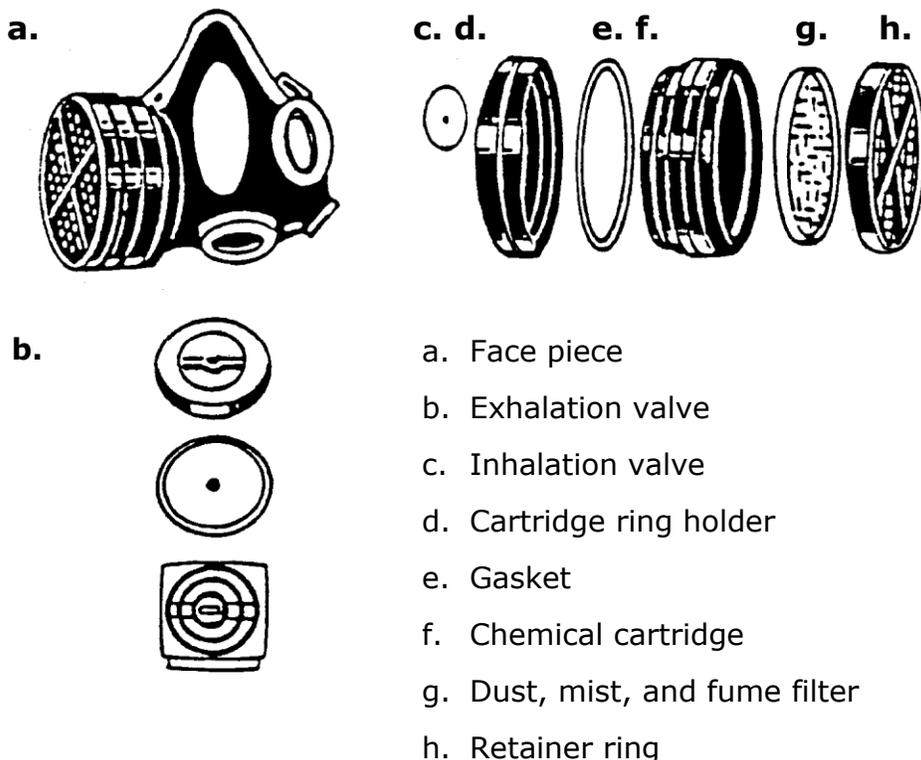
- Kept accessible to the work area
- Stored in compartments or in covers that are clearly marked as containing emergency respirators
- Stored in accordance with any applicable manufacturer instructions

Respirators should be cleaned and disinfected according to the procedures in Appendix B-2 of 1910.134, Respirator Cleaning Procedures (Mandatory). Commercially available cleaners can be used as long as they do not cause damage to the respirator and the instructions regarding water temperature, contact time, drying, and storage are followed. The respirators should be dried and then stored in sealed, clean containers away from the source of contaminants. Respirators cannot be sterilized. Remember:

- Respirators that are used by only one person must be cleaned as necessary.
- Any respirator must be disinfected before another person uses it.
- Respirators for emergency use, fit testing, and training must be disinfected after every use.

Half- or full-face respirators have many different parts that all need to be checked and replaced as they wear out. These may include:

- a. **Facepiece**—needs to be clean and not warped or cracked, especially along the sealing surface that contacts the skin
- b. **Exhalation valve**—is critical to the performance of the respirator. It allows exhaled air to escape without allowing in air directly from the outside. This valve needs to be properly seated and clean to function.
- c. **Inhalation valve**—prevents the exhaled air from flowing back through the cartridges. The valves should be clean and lie flat against the inhalation port.
- d. **Cartridge ring holder**—holds the cartridges and filters. It must not be cracked or warped. Not all respirators use a cartridge ring holder.
- e. **Gaskets**—create a good seal between the retainer ring and cartridge and need to be in place and in good condition
- f. **Chemical cartridge**—available for various contaminants. These should be NIOSH approved for the chemical hazard in question. The manufacturer’s end-of-service-life indicator (ESLI) recommendations should be followed regarding the use life of the cartridge or a change out schedule should be followed.
- g. **Particulate filters**—can be used with a chemical cartridge or as a single unit if only dust exposures are encountered. These also need to be NIOSH-approved and replaced per manufacturer’s recommendation.
- h. **Retainer ring**—ensures that the dust filter is retained properly over the chemical cartridge and needs to be in good repair and not cracked or warped
- i. **Head band straps (not shown)**—are critical in maintaining the seal. The straps need to be elastic and in good repair. Plastic cradle straps should be pliable and not cracked or broken.



- a. Face piece
- b. Exhalation valve
- c. Inhalation valve
- d. Cartridge ring holder
- e. Gasket
- f. Chemical cartridge
- g. Dust, mist, and fume filter
- h. Retainer ring

Routinely used respirators should be inspected before use and during cleaning. Emergency-use respirators must be inspected monthly and before and after each use. Emergency escape-only respirators must be checked before being carried into the workplace for use. Respirator inspections should include the following:

- Check 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 the cartridges, canisters, or filters.
- Check the elastomeric parts for pliability and signs of deterioration.
- Ensure that all canisters and filters are properly labeled and color-coded with the NIOSH approval label, and that the label is not removed, obscured, or defaced while in service.
- Inspect self-contained breathing apparatus respirators monthly. Air and oxygen cylinders must be maintained in a fully charged state, and must be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level. Ensure that the regulator and warning devices function properly.
- Certify emergency-use respirators by documenting the inspection, inspector's name (or signature), findings, required remedial action, and serial number or other means of identifying the inspected respirator. This information must be provided on a tag or label that is attached to the storage compartment of the respirator, kept with the respirator, or stored as a report or electronic file. This information must be maintained until replaced following a subsequent certification.

Respirators that fail an inspection or are found to be defective must be removed from service and discarded, repaired, or adjusted according to the following procedures:

- Repairs or adjustments to respirators are to be made only by persons appropriately trained to perform such operations and must use only the respirator's manufacturer's NIOSH-approved parts designed for the respirator.
- Repairs must be made according to the manufacturer's recommendations and specifications for the type and extent of the repairs to be performed.
- Reducing and admission valves, regulators, and alarms shall be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

Evaluation of program effectiveness

The employer or the safety and health representative must continually enforce and evaluate the respirator program to ensure that the program is effective. Program evaluation should include feedback from respirator users. If an employee has problems wearing the respirator, the employee's respirator usage should be reviewed. If the employee is having physical problems, they should see a physician to determine if their medical problems prevent them from wearing a respirator. Employees with medical problems such as emphysema, asthma, or heart disease should receive medical approval prior to being assigned a task requiring the use of a respirator. Users must be medically fit to wear a respirator.

Various medical and biological monitoring programs also provide important information on the effectiveness of respirator use. If your workplace has a medical monitoring program, you should check with the medical provider for recommendations on improvements needed in your Personal Protective Equipment Program.

Program evaluation should address the following questions:

- Do your employees wear the assigned respirators at the appropriate times?
- Do the employees properly wear and maintain the respirators?
- Are the respirators cleaned and stored properly?
- Do the employees know when to change the cartridges or filters?
- Has anyone noticed any problems with the equipment?
- Do the results of the medical monitoring program show any problems with excessive exposures?
- Do the employees understand the health hazards present and the proper precautions to be followed?

Recordkeeping

Employers must retain a **written** copy of their current respirator program.

Medical evaluations and fit-testing records must also be retained for every employee required to wear a respirator, including elastomeric facepiece respirators. A record of fit tests must be established and retained until the next fit test. These records must be made available to the employee and to OSHA in accordance with 1910.1020.

Resources

Oregon OSHA topic page: respiratory protection

<http://osha.oregon.gov/Pages/topics/respiratory-protection.aspx>

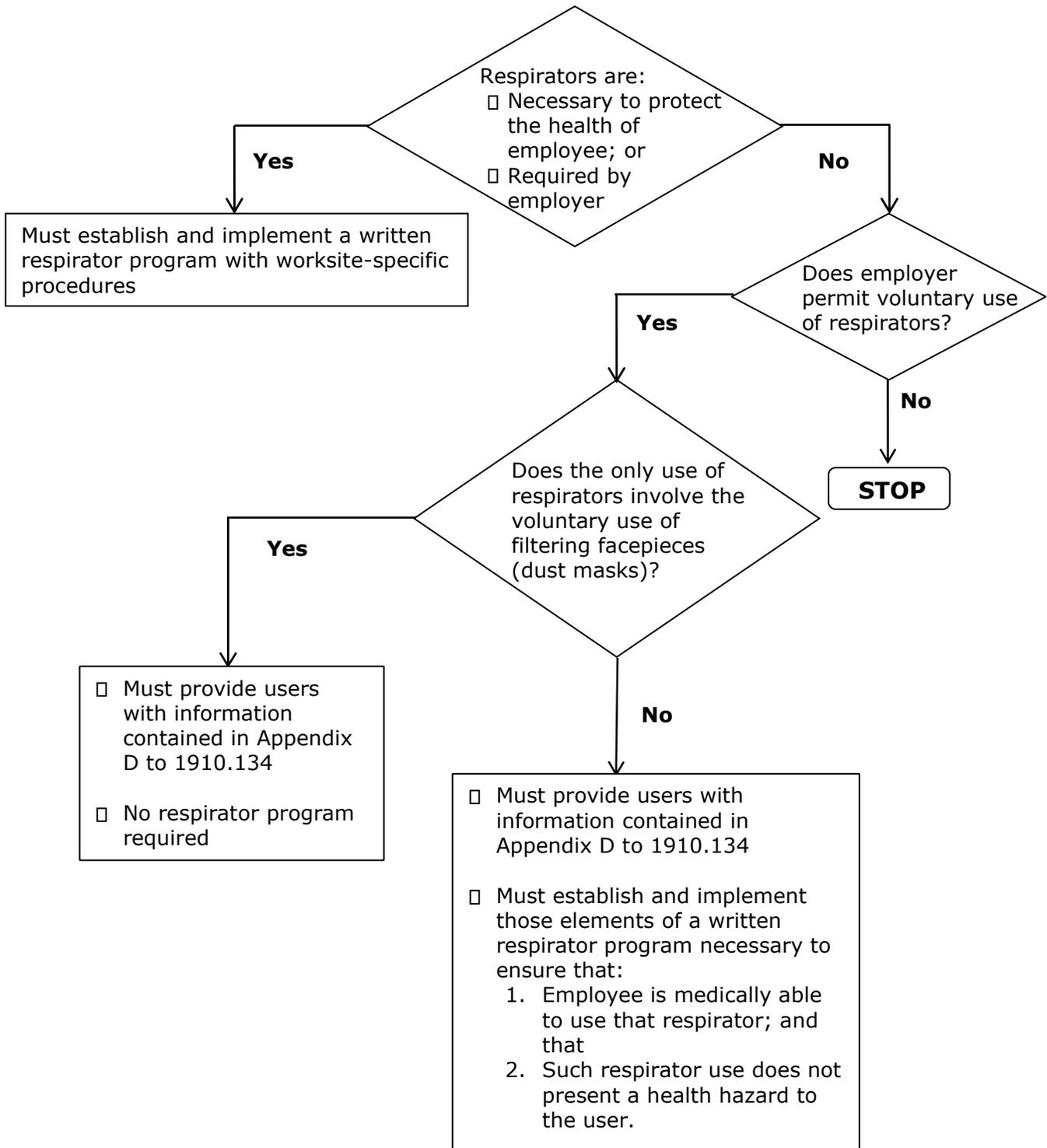
Federal OSHA safety and health topics: respiratory protection

<https://www.osha.gov/SLTC/respiratoryprotection/index.html>

CDC/NIOSH workplace safety & health topics: respirators

<http://www.cdc.gov/niosh/topics/respirators/>

Appendix A: flowchart guide to requirements



Appendix B: sample respiratory protection program

Policy

It is the policy of this company to provide its employees with a safe and healthful work environment. The guidelines in this program are designed to help reduce employee exposure to occupational air contaminants and oxygen deficiency. The primary objective is to prevent excessive exposure to these contaminants. This is accomplished as far as feasible by accepted engineering and work practice control methods. When engineering controls are not feasible, or while they are being implemented or evaluated, respiratory protection may be required to achieve this goal. In these situations, respiratory protection is provided at no cost to the employees.

Responsibilities

1. Management

It is management’s responsibility to determine what specific applications require the use of respiratory protective equipment. Management must also provide proper respiratory protective equipment to meet the needs of each specific application. Employees must be provided with adequate training and instructions on all equipment.

2. Management/supervisory

Superintendents of each area are responsible for ensuring that all personnel under their control are completely knowledgeable of the respiratory protection requirements for the areas in which they work. They are also responsible for ensuring that their subordinates comply with all facets of this respiratory protection program, including respirator inspection and maintenance. They are responsible for implementing disciplinary procedures for employees who do not comply with respirator requirements.

3. Employees

It is the responsibility of the employee to have an awareness of the respiratory protection requirements for their work areas (as explained by management). Employees are also responsible for wearing the appropriate respiratory protective equipment according to proper instructions, and for maintaining the equipment in a clean and operable condition.

Program administration

1. The following individual has total and complete responsibility for the administration of the respiratory protection program.

Name _____ Title _____

Department _____ Signature _____

This individual has the authority to act on any and all matters relating to the operation and administration of the respiratory protection program. All employees, operating departments, and service departments will cooperate to the fullest extent.

This person is referred to as the Respiratory Protection Program Administrator in this written program.

This individual is responsible for monitoring or conducting an exposure assessment of the respiratory hazard, developing standard operating procedures for this program, maintaining records, and conducting program evaluations.

2. The following person is responsible for contaminant identification and measurement, including technical support, air sampling, and laboratory analysis.

Name _____ Title _____

Department _____ Signature _____

3. The following individual is responsible for evaluating the health of the company employees via a comprehensive medical and health program.

Name _____ Title _____

Department _____ Signature _____

4. The following individual is responsible for directing and coordinating engineering projects which are directly related to respiratory protection.

Name _____ Title _____

Department _____ Signature _____

5. The following individual is responsible for selection, issuance, training, and fit testing of all respirators used in this company including recordkeeping.

Name _____ Title _____

Department _____ Signature _____

Medical evaluation

Every employee who is being considered for inclusion in the Respiratory Protection Program must participate in a medical evaluation. A determination of the employee's ability to wear a respirator while working is made initially before fit testing. Future evaluations are made when there is a change in workplace conditions or information indicating a need for re-evaluation.

[Describe procedures for medical evaluation and attach to this program. A mandatory medical evaluation questionnaire in 1910.134 must be used and reviewed by the company physician or otherwise licensed healthcare professional (PLHCP). If the PLHCP deems it necessary, the employee will receive an examination. The purpose of the medical evaluation is to assure that the employee is physically and psychologically able to perform the assigned work while wearing respiratory protective equipment. If the PLHCP denies approval, the employee will not be able to participate in the Respiratory Protection Program. Copies of the medical evaluation and questionnaire must be kept in the employee's file.]

Respirator selection

1. Work area monitoring

Exposure assessment will be done to ensure proper respirator selection. To determine the exposure level, air samples of the workplace representative of the work period, exposure assessment based on an analogous process, or professional judgment will be used. Personal sampling equipment may be used in accordance with accepted industrial hygiene standards to sample each work area. Results of these samples will pinpoint areas where respiratory protection is required.

The exposure assessment will be performed prior to the task requiring respiratory protection. Periodically, thereafter as required by OSHA substance specific standards or at least every 12 months, a review of the exposure assessment will be made to determine if respiratory protection is still required. If respiratory protection is still necessary, respirator selections will be reviewed to assure continued suitability.

[Attach records of all exposure assessments to this program. A sample form is provided].

2. Respirator selection

Respirators are selected and approved by management. The selection is based on the physical and chemical properties of the air contaminants and the concentration level likely to be encountered by the employee. The Respiratory Protection Program Administrator will make a respirator available immediately to each employee who is assigned to a job that requires respiratory protection. Replacement respirators/cartridges and filters will be made available as required by end-of-service life indicators or a change-out schedule.

The selection of the proper respirator type will be made following the attached procedures. [Attach selection procedures.]

All respirators will be NIOSH approved. Respirators will be purchased from _____

Respirators currently approved for use are _____

[Attach documentation of respirator selection to this program. A sample form is provided].

3. Use of respirators

All tight-fitting respirators (both negative and positive pressure) shall not be used with beards or other facial hair or any other condition that prevents direct contact between the face and the edge of the respirator or interferes with valve function.

Employees will be required to leave the contaminated area:

1. Upon malfunction of the respirator
2. Upon detection of leakage of contaminant into the respirator
3. If increased breathing resistance of the respirator is noted
4. If severe discomfort in wearing the respirator is detected
5. Upon illness of the respirator wearer, including, sensation of dizziness, nausea, weakness, breathing difficulty, coughing, sneezing, vomiting, fever, and chills
6. To wash face to prevent skin irritation
7. To change filter/cartridge elements or replace respirators as mandated by the

Respirator training and fitting

1. Training

Employees assigned to jobs requiring respirators will be instructed regarding the respiratory protection program by their supervisor relative to their responsibilities. They will also be instructed in the need, use, limitations, and care of their respirator. Training will take place prior to job assignment and at least every 12 months thereafter. [Attach training documentation to this program.]

2. Fit testing

Employees will be properly fitted and tested for a face seal prior to the use of the respirator in a contaminated area. [Attach fit test procedures to this program.]

Fit testing will be conducted initially upon employee assignment to an area where respirators are required. Fit testing will be repeated at least every 12 months thereafter. All tight-fitting respirators (negative and positive pressure) will be fit tested. Positive pressure tight-fitting respirators will be fit tested in the negative pressure mode. [Attach fit testing records to this program.]

Fit testing will not be done on employees with facial hair that passes between the respirator seal and the face or interferes with valve function. Such facial hair includes stubble, beards, and long sideburns.

If it is determined that an individual cannot obtain an adequate fit with any tight-fitting respirator, a loose-fitting powered air-purifying or supplied-air respirator may be required instead.

Respirator inspection maintenance and storage

Respirators must be properly maintained to retain their original effectiveness. The maintenance program will consist of periodic inspection, repair, cleaning, and proper storage.

1. Inspection

The wearer of a respirator will inspect it daily whenever it is in use. _____ will periodically spot respirators for fit, usage, and condition. [Attach inspection procedures for the respirators in use to this program.] The use of defective respirators is not permitted. If a defective respirator is found during inspection, it must be returned to the following individual:

2. Repair

During cleaning and maintenance, respirators that do not pass inspection will be removed from service and will be discarded or repaired. Repair of the respirator must be done with parts designated for the respirator in accordance with the manufacturer's instructions before reuse. No attempt will be made to replace components or make adjustments, modifications, or repairs beyond the manufacturer's recommendation.

3. Cleaning

Respirators not discarded after one shift use, except filtering facepiece type, will be cleaned on a daily basis or after each use, according to the manufacturer's instructions by the assigned employee or other person designated by the Respiratory Protection Program Administrator. Facilities and supplies for cleaning these respirators will be made available [Attach detailed cleaning procedures to this program.]

4. Storage

Respirators not discarded after one shift use will be stored in a location where they are protected from sunlight, dust, heat, cold, moisture, and damaging chemicals. They shall be stored in a manner to prevent deformation of the facepiece and exhalation valve. Whenever feasible, respirators not discarded after one shift use will be marked and stored in such a manner to assure that they will be worn only by the assigned employee. If use by more than one employee is required, the respirator will be cleaned between uses.

5. Compressed air systems

Special precautions will be taken to assure breathing quality air when an air-line respirator or SCBA is to be used. This air will meet the specifications for Grade D Air established by the Compressed Gas Association as stated in Commodity Specification for Air (ANSI/CGA G-7.1), 1989. Cylinders of purchased breathing air must have a certificate of analysis from the supplier that the air meets Grade D requirements. The moisture content in the cylinder must not exceed a dew point of -50°F at 1 atmosphere pressure. For air from compressors, the moisture content must be minimized so that the dew point at 1 atmosphere pressure is at least 10°F below the ambient temperature.

Escape-only respirators

Where escape-only respirators are provided due to the potential for an emergency, personnel assigned to the area will be trained in their use. Escape-only respirators shall be NIOSH certified for escape from the atmosphere in which they will be used. Personnel not assigned to a work area, including visitors, shall be briefed in their use.

Emergency use respirators

1. Locations

Self-contained breathing apparatus (SCBA) are found in the following locations: _____

2. Special requirements

All potential users will be fully trained in the use of this equipment. They must also be medically qualified to wear the device. When the equipment is used, it will be tested in an uncontaminated atmosphere prior to entering the hazardous area.

An employee will not work with this apparatus in a hazardous atmosphere on an individual basis. At least one additional employee suitably equipped with a similar breathing apparatus must be in contact with the first employee and must be available to render assistance if necessary. Additional requirements are necessary for interior structural firefighting.

This equipment will be inspected before and after each use and at least monthly by trained department or group personnel. Inspection and maintenance information will be recorded. [Specify method of recording information, e.g., inspection tag and/or log book.]

[Attach content of the SCBA training program and inspection procedures to this program.]

Program evaluation

The workplace will be reviewed and evaluated at least every 12 months 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. [Attach audit criteria to this program.]

A written report will be made of each evaluation summarizing the findings. For each deficiency identified, corrective action will be noted. Copies of the summary reports shall be attached to this program.

Exposure assessment record

Respiratory Protection Administrator _____

Job _____ Date _____

Location _____

I. Job Description: _____ Routine _____ Emergency _____

Describe work performed and length of time involved _____

II. Contaminants:

| Concentration (measured or estimated) | Reference (report, date of survey, sample) | OEL* | Hazard ratio** |
|---|--|------|----------------|
| | | | |
| | | | |
| | | | |

* OEL = Occupational Exposure Limit: PEL, TLV, REL, WEEL or other company specified limit.

** The Hazard Ratio is the quotient of the measured or estimated concentration divided by the appropriate occupational exposure limit. Respiratory protection is required if this value is greater than one and all feasible engineering and work practice controls have been implemented to reduce the concentration to as low as possible.

Note: For those contaminants for which respiratory protection is desired, the information from Part II above must be transferred to the Respiratory Selection Documentation form.

Respirator selection documentation

Step 1. Respiratory Hazard Identification

Oxygen Concentration _____ Contaminant(s) _____
Physical State(s) _____ Concentration _____

Step 2. Hazard Analysis

Permissible Exposure Limit _____
Protection Factor Needed _____
Skin Absorption/Irritation _____ Eye Irritation _____
Warning Properties: Odor Threshold _____ Nose/Throat Irritation _____
IDLH Concentration _____
Lower Flammable Limit _____
Service Life Information _____
Chemical Cartridge Changeout Time _____

Step 3. Respirator Type Required

Minimum Acceptable _____ Alternative _____

Step 4. Specific Selections

Appendix B-1 | user seal check procedures 1910.134 I-55 (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 10 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.

Stat. Auth.: ORS 654.025(2) and 656.726(3).

Stats. Implemented: ORS 654.001 through 654.295.

Hist: Oregon OSHA Admin. Order 3-1998, f. 7/7/98, ef. 7/7/98.

Appendix B-2 | respirator cleaning procedures I 1910.134 I-57 (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°C. [110°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°C. [110°F.] maximum), preferably running water. Drain.
- D. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for 2 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°C. (110°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°C. (110°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°C. [110°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.

Stat. Auth.: ORS 654.025(2) and 656.726(3).

Stats. Implemented: ORS 654.001 through 654.295.

Hist: OR-OSHA Admin. Order 3-1998, f. 7/7/98, ef. 7/7/98.

Apéndice B-1 | procedimientos de verificación del sello por el usuario parte 29 CFR 1910.134 mandatorio

El individuo que utiliza un respirador de cartucho químico de acoplamiento ajustado deberá efectuar una verificación del sello por el usuario cada vez que se coloca el respirador de cartucho químico para cerciorarse que un sello adecuado se ha logrado. Se utilizará ya sea la verificación de presión positiva o negativa identificada en este apéndice, o la verificación del sello por el usuario recomendada por el fabricante del respirador de cartucho químico. Las verificaciones del sello por el usuario no substituyen las pruebas de sello cualitativa o cuantitativa.

I. Verificación de presión positiva y(o) negativa de la mascarilla

- A. Verificación de presión positiva.** Tape la válvula de exhalación y exhale suavemente dentro de la mascarilla. El acoplamiento a la cara se da por satisfactorio si se genera una leve presión positiva dentro de la mascarilla sin evidencia de fuga de aire hacia el exterior al contorno del sello. Para la mayoría de respiradores de cartucho químico, este tipo de prueba de fuga requiere que el usuario primero quite la tapadera de la válvula de exhalación antes de tapar la válvula de exhalación y después reponerla cuidadosamente después de la verificación.
- B. Verificación de presión negativa.** Tape la apertura de entrada del bote o los cartuchos cubriéndolo(s) con la(s) palma(s) de la(s) mano(s) o reemplazando el sello del bote o los de los cartuchos. Aspire suavemente para que se colapse ligeramente la mascarilla, y aguante la respiración por diez segundos. El diseño de la apertura de entrada de algunos cartuchos previene cubrir efectivamente con la palma de la mano. Esta prueba puede realizarse tapando la apertura de entrada del cartucho con un guante de látex o nitrilo. Si la mascarilla se mantiene en su estado de colapso y filtración de aire hacia el interior no se nota, el ajuste del respirador de cartucho químico se da como satisfactorio.

II. Recomendaciones del fabricante para el procedimiento de verificación del sello por el usuario

Los procedimientos recomendados por el fabricante del respirador de cartucho químico para realizar la prueba de sello por el usuario pueden utilizarse en vez de la prueba de presión positiva y(o) negativa siempre y cuando el patrón demuestre que los procedimientos del fabricante son igualmente efectivos.

Apéndice B-2 | procedimientos de limpieza del respirador CFR 1910.134 (obligatorio)

Estos procedimientos son provistos para uso del patrón para la limpieza de respiradores. Los procedimientos son de naturaleza general, y el patrón puede utilizar las recomendaciones por el fabricante del respirador como alternativa para el uso de sus trabajadores si es que éstos son tan efectivos como los recomendados en el Apéndice B-2. Una efectividad equivalente simplemente significa que los procedimientos deben cumplir los objetivos establecidos en el Apéndice B-2, o sea, debe cerciorarse que el respirador está limpiado y desinfectado debidamente de tal manera que prevenga daños al respirador y no cause lesiones al usuario.

I. Procedimientos para limpiar respiradores

- A.** Quite los filtros, cartuchos o botes. Desarme las mascarillas quitando los diafragmas del habla, ensamblajes de válvulas tipo demanda y presión demanda, mangueras, y cualquier otros componentes recomendados por el fabricante. Deseche o repare cualquier pieza defectuosa.
- B.** Lave los componentes con agua tibia (43 °C. [110 °F.] máximo) y un detergente suave o con un limpiador recomendado por el fabricante. Puede usar un cepillo de cerda firme (no de metal) para quitar la suciedad con más facilidad.
- C.** Enjuague los componentes por completo, en agua limpia y tibia (43 °C. [110 °F.] máximo) preferentemente con agua corriente. Escúrralos.
- D.** Cuando el limpiador utilizado no contiene una substancia desinfectante, los componentes del respirador deberán sumergirse en una de las siguientes por dos minutos:
 - 1.** Solución de hipoclorito (50 ppm de cloro) mezclando aproximadamente un mililitro de cloro de lavar por litro de agua a 43 °C. (110 °F.); o,
 - 2.** Solución acuosa de yodo (50 ppm de yodo) mezclando aproximadamente 0.8 mililitros de tintura de yodo (6-8 gramos de yoduro amónico y/o yoduro potásico/100 cc de alcohol de 45%) por litro de agua a 43 °C. (110 °F.); o,
 - 3.** Otros limpiadores comerciales de características desinfectantes equivalentes utilizadas conforme a las instrucciones, si su uso está recomendado o aprobado por el fabricante del respirador.
- E.** Enjuague los componentes por completo, en agua limpia y tibia (43 °C. [110 °F.] máximo) preferentemente con agua corriente. Escúrralos. La importancia de un enjuague completo debe ser enfatizado. Detergentes o desinfectantes que se secan sobre las mascarillas pueden causar dermatitis. Además, algunos desinfectantes pueden causar la deterioración del hule u oxidación de las partes metálicas si no se les quita por completo.
- F.** Los componentes deben secarse a mano con un trapo sin pelusa, o ser secados al aire.
- G.** Arme el respirador reemplazando los filtros, cartuchos y botes cuan sea necesario.
- H.** Pruebe el respirador para asegurarse que todos los componentes funcionan apropiadamente.

Appendix C | comparison of respirators in health care

Surgical mask (not considered a respirator)

- FDA clearance required
- Masks that provide protection against pathogens carried by large respiratory droplets that can contaminate the mucous membranes; sometimes called procedure, isolation, or laser masks



| Pros | Cons |
|---|--|
| Designed to cover the mouth and nose loosely | Do not have a sealing surface and does not prevent leakage around edge of mask |
| Usually strapped behind the head | Cannot be decontaminated |
| Made of soft materials and are comfortable to wear | Minimal protection against airborne contaminants |
| Provide protection against body fluid splashes to the nose and mouth. | Not accepted by OSHA for employee protection |
| Easier to breathe through than respirator | |

Surgical N-95 filtering facepiece

- NIOSH certification, FDA clearance
- Requires two straps
- Does not have exhalation valve
- **Must implement OSHA Resp. Protection Program, if use is required**



| Pros | Cons |
|---|---|
| Provides patient and wearer protection | Can be uncomfortable when worn for long periods — hot, will fog glasses |
| Provides protection from small inhalable particles and splashes of large droplets | Requires medical evaluation and fit-testing before use |
| Single use – disposable | Cannot be decontaminated |
| Tested for fluid resistance, biocompatibility and flammability | Cannot be worn with facial hair that interferes with the seal |
| Filter 95-97% of most penetrating size particles | Harder to breathe through than a surgical mask |

N-95 respirator (air-purifying respirators for particulates)

- NIOSH certification
- **Does not have** FDA clearance (exhalation valve)
- **Require implementation of OSHA Resp. Protection Program if use is required**



with exhalation valve

| Pros | Cons |
|--|---|
| More comfortable during extended use - exhalation valve reduces moisture build-up inside the facepiece | Cannot be used in sterile field environment |
| Not all are disposable | Not all are disposable |
| Provides protection against airborne contaminants | Requires medical evaluation and annual fittesting |
| Filter 95-97% of most penetrating size particles | Harder to breathe through than a surgical mask |
| Designed to form a tight seal to the face | Not designed to be used in surgery |

Air-purifying elastomeric facepiece (vapor/gas or particulate)

- NIOSH Certification
- **NOT** FDA approved (exhalation valve)
- **Must implement OSHA Resp. Protection Program**



| Pros | Cons |
|--|--|
| More comfortable during extended use - exhalation valve reduces moisture build-up inside the facepiece | Cannot be used for patient care/treatment |
| Cartridges for different vapors and gases | Must determine appropriate cartridge |
| Provides protection against airborne contaminants | Requires medical evaluation and fit-testing annually |
| Can be disinfected/decontaminated | Requires cleaning and disinfection between uses |
| Can be used by another after decontamination | May interfere with voice communication |
| Full facepiece provides eye protection | Must determine change-out schedule |
| | Harder to breathe through than a facemask |

Powered air-purifying respirator (PAPR)

- NIOSH certification
- Some have FDA clearance
- **Must implement OSHA Resp. Protection Program**



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| Pros | Cons |
|--|--|
| Provides wearer protection from airborne (aerosols and vapors) contaminants | More expensive than other respirators |
| Provides greater level of protection than filtering facepiece or elastomeric respirators | Blower unit/battery typically works on belt and can weigh 1.5 to 3 lbs. |
| Hooded PAPRs do not need to be fit-tested and can be worn with facial hair or medical restriction. | Fan noise can make communication and medical care delivery more difficult. |
| Reduces/eliminates breathing resistance and moisture buildup inside the facepiece/hood | Requires cleaning and disinfection between uses |
| Filters are replaceable. | Used filters must be considered potentially contaminated. |
| Can be decontaminated and used by different individuals | Appearance may be alarming |
| Full facepiece provides eye protection. | |

Supplied air respirators (SCBA and air-line)

- NIOSH certification
- Must implement OSHA Resp. Prot. Program



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| Pros | Cons |
|--|--|
| Provides wearer best protection from airborne (aerosols and vapors) and unknown contaminants | More expensive than other respirators |
| Breathing air supplied, thus air-purifying filters not required | Supplied air must be certified/tested and may require alarms. |
| Some may have cooling mechanism for hot environments. | Breathing cylinder may be cumbersome/heavy and air-line limits mobility. |
| | Communication and medical care delivery are more difficult. |
| | Decontamination required before each use |

Appendix D | table I and drawings from OSHA publication 3352-02-2009 assigned protection factors for the revised respiratory protection standard

Table I: Assigned Protection Factors⁵

| Type of Respirator ^{1,2} | Quarter mask | Half mask | Full facepiece | Helmet/Hood | Loose-fitting facepiece |
|---|--------------|-----------------|----------------|-----------------------|-------------------------|
| 1. Air-Purifying Respirator | 5 | 10 ³ | 50 | — | — |
| 2. Powered Air-Purifying Respirator (PAPR) | — | 50 | 1,000 | 25/1,000 ⁴ | 25 |
| 3. Supplied-Air Respirator (SAR) or Airline Respirator | | | | | |
| • Demand mode | — | 10 | 50 | — | — |
| • Continuous flow mode | — | 50 | 1,000 | 25/1,000 ⁴ | 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:

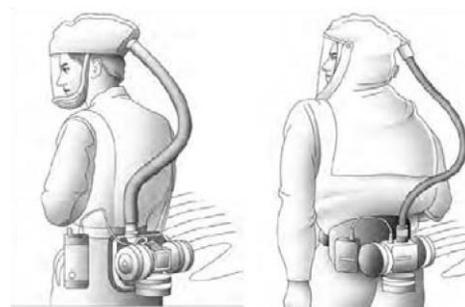
- ¹ Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.
- ² The assigned protection factors in Table I are only effective when 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.
- ³ This APF category includes filtering facepieces, and half masks with elastomeric facepieces.
- ⁴ 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.
- ⁵ 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).



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



Loose-Fitting Powered Air-Purifying Respirator (PAPR)
APF= 25

Hood Powered Air-Purifying Respirator (PAPR)
APF= 25



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