

RESPIRATORY PROTECTION PROGRAM (RPP)

CAL POLY Facilities Management
& Development
Environmental Health & Safety

RESPIRATORY PROTECTION PROGRAM



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RESPIRATORY PROTECTION PROGRAM (RPP)

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RESPIRATORY PROTECTION PROGRAM (RPP)

Purpose

Employees of California Polytechnic State University (Cal Poly) may be exposed to materials that pose a respiratory hazard in the course of their work. Cal Poly provides respiratory protective equipment based on assessments of potential or known exposure to respiratory hazards and has developed a program and procedures for their safe use in compliance with California Code of Regulations, [Title 8, Section 5144](#). Reasonable measures should be taken to reduce respiratory hazards to safe levels should be implemented first when feasible. When necessary, respiratory protective equipment must be used to control respiratory hazards, and may be used to supplement other hazard control methods.

The Cal Poly Respirator Protection Program (RPP) establishes the procedures and administrative requirements necessary for use of respiratory protective equipment. It provides health and safety information and guidance to those persons falling within the jurisdiction of this program as described in the following section.

Scope and Application

The RPP applies to all Cal Poly Faculty and Staff. It also applies to students paid or partially paid by the university, a sponsor, fellowship, or grant. It applies whether the use is required as personal protective equipment (PPE) or is by choice or voluntary* and to all types of respirators. Note that the use of dust masks and surgical masks is not part of the RPP.

*See Voluntary Use of Respirators, page 11 and attachments 1, 2.

The RPP does not apply to students, student volunteers, or non-employee research students. Faculty and student organization leaders are encouraged to maintain safe environments and activities in which respirator use is neither necessary nor required. Faculty members and student organization leaders that require students to wear a respirator must make appropriate arrangements to ensure that use is conducted safely and in accordance with any applicable laws, standards, and best practices. The Environmental Health and Safety (EHS) Department is available for consultation.

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Note that the word “must” is used in this document for requirements that are mandatory in nature, and the word “should” to denote items that are advisory in nature.

Roles and Responsibilities

All Cal Poly Staff, Faculty, and Eligible students must

- Be aware of the requirements of this program and never wear a respirator (except voluntary use of N-95 type respirators) without first being medically cleared to do so, fit tested by EHS, and up to date on training in the use of respirators.
- Know that they may request the use of a respirator from their employer at any time and be voluntarily enrolled in the RPP.
- Inform their supervisor of any personal health problems that could be aggravated by the use of respiratory protection equipment.
- Inform their supervisor of new situations in their work environment where respiratory protection equipment may be needed.

Departments that have respirator users – Specifically the PI or other manager/supervisor

Departments on campus that perform research or other activities that require use of a respirator must:

- Identify employees who may need respiratory protection equipment.
- Ensure that employees complete annual fit tests and training as well as biennial medical clearances.
- Schedule a new medical clearance test if there has been a change in a health event.
- Enforce the use of respiratory protection equipment when required.
- Provide for proper storage, inspections, and maintenance for respiratory protection equipment.
- Provide voluntary users of respirators with:
 - Appendix D (9.1 – 9.2) of the Cal-OSHA Respiratory Protection Standard (Attachment 1 of this program).
 - An acknowledgement form: “EMPLOYEE ACKNOWLEDGEMENT OF RECEIPT OF TITLE 8 CRR SECTION 5144 APPENDIX D (9.1 - 9.2)”

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(Attachment 2 of this program). The form shall be maintained by the program and a copy shall be sent to EHS.

Department Safety Coordinator or Other Responsible Person must:

- Ensure that all aspects of this program are implemented in their department including the medical clearance, fit test, and training.

Respirator Users

All Cal Poly Faculty, Staff, and Eligible Students who are required or request to wear a respirator must:

- Use the respirator in accordance with this program and any trainings.
- Work in accordance with any restrictions of respirator use placed by the medical clearance process and inform their supervisor if an assignment precludes adherence to any restrictions.
- Guard respiratory protection equipment against damage, and ensure that respirators are not altered in any way other than changing cartridges or filters. Users must also care for their respirators through routine inspections, cleaning after use, and proper storage.
- Use only the respirator to which the employee was trained and fitted.
- Report any malfunction of respiratory equipment to EHS.
- Use the correct type of respirator and cartridge/ filter for the hazard involved.
- Exchange cartridges whenever breakthrough of filters is detected, or per the manufacturer's minimum exchange guidelines.
- Inform supervisor of new situations which arise where respiratory protection equipment may be necessary.
- Schedule with EHS the Cal-OSHA required annual fit test.
- Complete the annual assigned training.
- Complete the biennial medical clearance. If user experiences a medical event that might change their fitness to use a respirator, they should complete a new medical clearance before using respirator again.

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Environmental Health and Safety

Environmental Health and Safety is the Respiratory Protection Program manager. The Respiratory Protection Program Administrator from EHS must:

- Review and approve all purchases of respiratory protection equipment.
- Provide for instruction of affected departments and program enrollees on the need for respiratory protection, the selection of respirators, and respirator fitting, use, and maintenance.
- Refer personnel with suspected and identified medical problems that would preclude safe respiratory use for further medical examination.
- Provide fit testing of all persons required to wear respiratory protection equipment.
- Support the supply, maintenance, and cleaning of respiratory protection equipment.
- Recommend specific engineering controls for identified airborne hazards whenever possible.
- Provide technical consultation on issues relating to respiratory protection.
- Maintain records as required by this document.
- Maintain a running roster of personnel qualified to wear a respirator on campus.
- Conduct a periodic evaluation of the program and update as regulatory need or newly identified hazards may require.

Program Technical Information

Types and Selection of Respiratory Protection

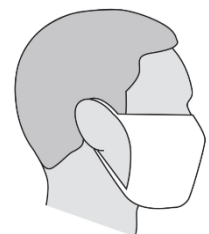
Dust and Surgical Masks

Description: Single-use, disposable masks. Generally not available from EHS but can be obtained from the Cal Poly Warehouse.

Advantages: Lightweight, disposable, comfortable, inexpensive, require no documentation or pre-requisites to use.

Limitations: These respirators offer essentially no protection from chemical hazards due to poor seal.

Applications: Low concentrations of nuisance dusts, pollen, and animal dander where airborne contaminant levels are always below the Permissible Exposure Limits (PELs).



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Protection Factor: 1

Typical Uses: Grounds keeping, sanding, woodworking, mixing powders, dry machining, sweeping floors, grinding, cleaning dirty area, use of leaf blowers, raking, or any other activity that generates nuisance dust.

N95 or N100 Filtering Face Piece

Description: Single use, disposable dust mask. Generally not available from EHS but can be obtained from the Cal Poly Warehouse. Has regulations by Cal-OSHA regarding their use, which may or may not require a medical clearance. Please contact EHS for proper guidance governing the use of N95 or N100 dust masks. (Note: The use of N95, KN95, N100 to prevent COVID-19 transmission is not part of the RPP).



Advantages: Lightweight, disposable, comfortable, inexpensive.

Limitations: Offers a much higher protection factor than dust and surgical masks, but less protection than elastomeric respirators. They cannot be used where facial hair interrupts the facial sealing surface.

Applications: Low concentrations of nuisance dusts, pollen, and animal dander where airborne contaminant levels are always below the PELs. Used as industry standard for BL3 lab entry and medical facilities with possible airborne hazards such as TB or other viruses. Animal facilities doing operations such as cage cleaning and preparation of TB infected mice also use these masks.

Protection Factor: 1

Typical Uses: Grounds keeping, sanding, woodworking, mixing powders, dry machining, sweeping floors, grinding, cleaning dirty area, use of leaf blowers, raking, medical facilities, animal research facilities, or any other activity that generates nuisance dust.

Half Face (Negative Pressure)

Description: This type of respirator has an elastomeric face seal which fits over the nose and under the wearer's chin. It is fitted with cartridges which purify the air as the wearer breathes. Different types of cartridges are available for different contaminants.

Advantages: Relatively lightweight, comfortable, offers good protection from low concentrations of air contaminants.

Limitations: Some users may experience irritation from the elastomeric face seal. The protection offered is not as good as a full-face piece air-purifying



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respirator. Air-purifying respirators cannot be used for all types of air contaminants. They cannot be used where facial hair interrupts the facial sealing surface, in atmospheres deficient in oxygen, in atmospheres that may be immediately dangerous to life or health (IDLH), or in atmospheres that have high concentrations ($>10 \times \text{PEL}$) of contaminants. They do not protect the eyes from irritating contaminants.

Applications: Protection afforded by these respirators depend upon the cartridge used. There are several different types of cartridges, and each type is designed to protect against a specific type of hazard. Cartridges are color coded to identify their applicability. The most common types of cartridges are:

- a) HEPA Cartridge: Useful for low airborne concentrations of toxic dusts, including asbestos, radio nuclides, and silica.
- b) Organic Vapor Cartridge: Useful for low airborne concentrations of most solvents, petroleum distillates, and glue vapors. Not useful against natural gas or propane, or vapors with poor warning properties.
- c) Acid Gas/Mist Cartridge: Useful in atmospheres containing low airborne concentrations of mineral acid gas or mist.
- d) Pesticide: Useful against low airborne concentrations of pesticide vapors or mists.
- e) Combination Cartridge: Useful for environments with low airborne concentrations of more than one contaminant present (e.g., vapor and particulate exposure).
- f) Mercury Cartridge: Useful for protection against low airborne concentrations of metallic mercury vapors.
- g) Other types of cartridges are also available.

Protection Factor: 10

Typical Uses: Painting, working with chemicals, welding, sanding, woodworking, mixing powders, dry machining, grinding, animal research facilities, lead and asbestos abatement operations, or any other activity that generates nuisance dust.

Full Face (Negative Pressure)

Description: Air-purifying full-face piece respirators are similar to half-mask respirators described above in that ambient air is filtered as the wearer breathes. Again, specific cartridges are available to protect against specific hazards. However, the full-face piece extends around the entire face, covering the eyes in addition to the nose, chin, and mouth.

Advantages: Full-face piece respirators provide a better seal and more protection than half-mask air-purifying respirators. They also protect the eyes from irritating vapors and mists or damage by splashed chemicals.



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Limitations: These respirators are heavier than half-masks. Skin irritation may be experienced by some individuals at the sealing surface. Eyeglasses must be specially adapted to these respirators to ensure that temple bars do not interrupt the respirator sealing surface. These respirators cannot be used when facial hair comes between the respirator sealing surface and the face, in oxy-gen deficient atmospheres, in IDLH atmospheres, or in atmospheres which have high concentrations (>50 x PEL) of contaminants.

Applications: Used in the same manner as half-mask air-purifying respirators. A full-face piece respirator is recommended where a greater degree of respiratory protection is needed or where eye protection is desirable.

Protection Factor: 10

Typical Uses: Painting, working with chemicals, welding, sanding, woodworking, mixing powders, dry machining, grinding, animal research facilities, lead and asbestos abatement operations, or any other activity that generates nuisance dust.

Powered Air Purifying Respirator (PAPR)

Description: This class of respirators features a battery powered, portable fan which draws air through a particulate or chemical filter and blows it to the face piece. The fan/ filter unit is usually mounted on the wearer's back or belt. Full or half-mask face pieces are available, as are a variety of helmets and hoods.

Advantages: The major advantage of this type of respirator comes from the positive-pressure provided to the face piece, hood, or helmet. This eliminates any difficulty in breathing provided by the negative-pressure respirators, provides improved cooling and comfort, and reduces the importance of a good facial fit. Individuals with facial hair can use hood or helmet models provided they have a medical exemption from shaving, or the department is willing to pay for the equipment.

Limitations: These units are relatively expensive to purchase and maintain. The battery and fan pack must be carried on the wearer's belt. This class of respirator cannot be used in IDLH atmospheres or in atmospheres deficient in oxygen. Heavy exertion may create negative-pressure, reducing the respirator's effectiveness.

Applications: PAPR respirators are recommended where a greater degree of respiratory protection is needed, where eye protection is desirable, or if the person has facial hair that would interfere with the sealing surface of negative pressure type respiratory protection.

Protection Factor: 50

Typical Uses: Animal research facilities, lead and asbestos abatement operations, or any other activity that requires a higher protection factor than negative pressure respirators.



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Program Requirements and Procedures

Elements of the Program

- Hazard Assessment – To minimize the need for respiratory protection equipment through the use of engineering controls (e.g., ventilation, isolation) and administrative controls whenever possible.
- Monitoring – To quantitatively measure exposures in order to characterize future task risk and ensure adequate protection.
- Enrollment of employees into the respiratory protection program.
- Prerequisites required for respirator use, including medical qualification, fit testing, and training.
- Criteria for the correct selection of respiratory protection equipment.
- Instructions detailing the use, cleaning, storage, maintenance, and inspection of respirators.
- Recordkeeping requirements for EHS and any department with personnel who are enrolled in the RPP.

Administrative Requirements

Hazard Assessment and Engineering Controls

Departments must evaluate work environments that may require respirator use to assess need and hazard control options. Departments should inform EHS of these activities. EHS can provide a template for listing tasks and associated hazards upon request.

Upon request, EHS evaluates new or unusual work environments to determine if there is an airborne hazard, and, if so, assists in developing engineering solution(s) to the problem. If reasonable engineering controls are available to negate the need for respirator use, they must be implemented. If the engineering or administrative solutions are not practical, EHS will make a recommendation for respiratory protection. If industrial hygiene (IH) sampling or other means of hazard evaluation are implemented, the sampling results and evaluation findings, including any proposed recommendations or test results, are submitted by EHS to affected employees, the department, and kept on file by the program administrator.

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Prerequisites for Use of Respiratory Protection Equipment

Authorization for mandatory use of respirators is required. Only those persons authorized by their supervisor and EHS to wear respiratory protection equipment, and who have been medically qualified, fitted, and trained may use such equipment.

To enroll an employee, the supervisor should direct the employee to visit the EHS Respiratory Protection webpage, https://afd.calpoly.edu/ehs/respiratory_protection, and fill out the form titled “Respiratory Protection Enrollment”. EHS may assess the need further before authorizing respirator use or providing other recommendations to control hazards involved.

Once EHS has authorized the use of a respirator, the Program Administrator will send an email to the enrolled employee with instructions for completing the medical clearance and fit test. The Program Administrator will also enroll the employee in annual respiratory protection training on The Learning Hub.

Voluntary use of respirators by employees who wish to wear a respirator for work when a respirator is not required may request a respirator from their supervisor or use their own, provided such respiratory use will not in itself create a hazard. Issuance is at the discretion of the affected department. Employees voluntarily using respirators must be medically qualified (except for N-95 respirators). The respirators must be properly cleaned, stored, and maintained. Supervisors must provide voluntary users of respirators with a copy of Appendix D (9.1 – 9.2) (Attachment 1 of this program) of the standard. The voluntary respirator user will sign an “Acknowledgement Form” that they have received and agree to comply with the requirements of Appendix D (9.1 – 9.2) (Attachment 2 of this program) of the standard. The acknowledgement form shall be retained by the department and a copy should be sent to EHS.

Medical Qualification

Prior to being trained and fitted for respirator use, personnel must complete a medical qualification exam. The exam is delivered as a questionnaire online which is reviewed by medical professionals. The results will be sent to the employee as well as the RPP Administrator. If a user does not pass the medical qualification, they will be sent to an in-person occupational health clinic for a more in-depth exam to determine fitness. The medical clearance exam must be repeated every 2 years. EHS will contact users at the beginning of the month of the date when their clearance expires to repeat the exam.

If an employee experiences a change in medical status, or experiences a medical event (e.g. heart attack, new diagnosis), they should complete a new medical clearance exam prior to wearing their respirator.

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Respiratory Protection Training

Training is delivered online using The Learning Hub. The content must be completed by each employee after their medical qualification and before their fit test. Employees will be automatically notified to complete their training each year.

Respiratory Fit Testing

Fit testing will be conducted by EHS once an employee has their medical clearance. Cal Poly uses qualitative fit test methods (see Attachments 2 and 3). Employees should bring their clean respirator and cartridge to the fit test. Employees must be clean-shaven the day of the fit test. If the employee passes the fit test, they are cleared to wear a respirator for one year.

The fit test must be repeated biennially. In addition, fit testing will be repeated when any change occurs which may alter respirator fit, such as:

- An employee obtains a new respirator.
- A weight change of 20 pounds or more.
- Significant facial scarring in the area of the facial seal.
- Significant dental changes, such as multiple extractions.
- Reconstructive or cosmetic surgery.
- Any other condition which may interrupt the face seal.

It is the responsibility of the employee to notify EHS if a new fit test is needed due to a circumstance such as the above. If an employee does not pass the fit test, a different type of respirator may be selected. The employee may not wear a respirator until they pass the fit test.

EHS will contact employees to schedule fit tests in January and in June. New employees/employees new to the program will have their fit test performed upon enrollment.

Program Evaluation

The Respiratory Protection Program Administrator must observe (and interview) at least 8 respirator users in at least 4 departments to ascertain whether the RPP is effective. An annual assessment report will be sent to the EHS Supervisor and EHS Director. The report

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will assess implementation of the current program, identify any needed changes and include assessment of:

- Respirator fit (including the ability to use the respirator without interfering with effective workplace performance).
- Appropriate respirator selection for the hazards to which the employee is exposed.
- Proper respirator use under the workplace conditions the employee encounters.
- Proper respirator maintenance.

Training Requirements

Personnel required to wear respiratory protection equipment are trained by The Learning Hub in the selection, care, use, and limitations of the equipment. Training must be repeated annually. At minimum, the training includes and the personnel must demonstrate knowledge of:

- The need for respiratory protection equipment.
- The types of situations which may require respirators.
- Description of prerequisites for respirator use, including medical clearance, training, and fit testing.
- A description of different types of respirators, their specific application, selection, and limitations.
- Issuance procedures for respirators.
- The proper use of respirators, including field fit check procedures and how to detect filter load up or breakthrough.
- Cleaning and sanitizing procedures.
- Proper storage of respirators.
- Inspection and maintenance procedures.
- The general requirements of the standard.

Record Keeping Requirements

Departments that have respiratory users

All departments that have respirator users should keep a log on file with names, assigned type of respirator protection, fit test date. Th is shall include a list of voluntary-use

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respirator users as well. For a current list of respirator users, please contact the EHS RPP Administrator.

Department Safety Coordinators

Should verify that all respirator users have current medical clearance, respirator training, fit test, and/or have signed the acknowledgement that they received a copy of “Appendix D” (9.1 - 9.2) (Attachment 2 of this program).

Respiratory Users

Users should keep their current copy of their respiratory fit test and medical clearance.

EHS – Respiratory Protection Program Administrator

EHS maintains a database of all Cal Poly respirator users. These records can be accessed anytime by EHS and supplied to department managers, supervisors, and safety coordinators. Individual users may email EHS to inquire about the status of their records.

References

ASTM F3387-19, Standard Practice for Respiratory Protection

Program History

Issued by: Aubrey Arain

Next review date: 2025

| Revision | Approval Date | Summary of change |
|----------|---------------|-------------------------------------|
| 1.0 | 09/2023 | Update to match current procedures. |
| 2.0 | 03/2023 | Reformat to improve useability. |

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Attachments

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Attachment 1 - OSHA 1910.134 Appendix D (9.1 - 9.2)

Appendix D to § 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.

[63 FR 1152, Jan. 8, 1998; 63 FR 20098, April 23, 1998]

Attachment 2 - Employee Acknowledgement of Receipt of OSHA 1910.134 Appendix D (9.1 - 9.2)

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EMPLOYEE ACKNOWLEDGEMENT OF RECEIPT OF TITLE 8CCR § 5144 APPENDIX D

Date: _____

I, _____, acknowledge that I have received and read Appendix D of Title 8 California Code of Regulations section 5144, as provided by my supervisor.

Employee's Department: _____

Employee's Signature : _____ Date: _____

Supervisor's Department: _____

Supervisor's Signature: _____ Date: _____

Cal/OSHA requires that employees who are enrolled in the voluntary-use Respiratory Protection Program (RPP) receive a copy of Appendix "D". By signing this form, this acknowledges that you received and understand that you have enrolled into the Cal Poly Respiratory Protection Program as a voluntary user. Copies of this signed form will be filed in the department's personnel folder and Voluntary-Use Respirator files at EH&S.

CC: EHS, Aubrey Arain: alarain@calpoly.edu

Attachment 3 - Qualitative Fit Test Protocol

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.

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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.

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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 two modified ambient aerosol CNC quantitative fit testing protocols, the CNP quantitative fit testing protocol, and the CNP REDON quantitative fit testing protocol. For the modified ambient aerosol CNC quantitative fit testing protocols, employers shall ensure that the test subjects (*i.e.*, employees) perform the exercise procedure specified in Part I.C.4(b) of this appendix for full-facepiece and half-mask elastomeric respirators, or the exercise procedure specified in Part I.C.5(b) for filtering facepiece respirators. Employers shall ensure that the test subjects (*i.e.*, employees) perform the exercise procedure specified in Part I.C.6(b) of this appendix for the CNP quantitative fit testing protocol, or the exercise procedure described in Part I.C.7(b) of this appendix for the CNP REDON quantitative fit testing protocol. For the remaining fit testing methods, employers shall ensure that the test exercises are performed 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)

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(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. ISIAMYL 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 °C (77 °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.

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(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

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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

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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).

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(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.

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Attachment 4 - Qualitative Fit Test User Form

California Polytechnic State University – Environmental Safety

Respirator Fit Test Record

A. Employee:

Date:

Employee Job Title: _____

Respirator Used For: Asbestos Lead Other _____

B. Employer: Cal Poly ASI Foundation Other

Shop/Department: _____

C. Respirator Selected: Filtering Facepiece, N95

Filtering facepiece, N95 Half face Full face

Make: _____

Model: _____

Cartridge: _____

Size: _____

Approval: _____

Test Conductor Completes This Section

Initial Fit

Test

D. Conditions Which Could Affect Respirator Fit:

Clean Shaven

Facial Scar

1-2 Day Beard Growth

Dentures Absent

2 + Day Beard Growth

Glasses

Mustache

Gain/ Loss of 20 lb. or More Since Last Fit Test

Comments: _____

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E. Fit Checks:

Negative Pressure - Not Done

Positive Pressure Pass Fail Not Done

F. Fit Testing:

Qualitative, Bitrex Qualitative, Banana oil

Sensitivity Threshold 10 20 30

a) Head stationary normal breathing (60 seconds) Pass Fail

b) Head stationary deep breathing (60 seconds) Pass Fail

c) Head turning side to side (60 seconds) Pass Fail

d) Head moving up and down (60 seconds) Pass Fail

e) Talking (recite rainbow passage) Pass Fail

f) Bending over (60 seconds) Pass Fail

g) Head stationary normal breathing (60 seconds) Pass Fail

h) Jog in place (Benzene, formaldehyde, asbestos) Pass Fail

Not Sensitive to Bitrex/ Saccharin, *Stop not able to perform fit test.*

G. Test results Pass Fail

Comments:

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H. Employee Acknowledgment of Test Results:

Employee Signature:

Date:

Test Conducted By:

Date:

DISCLAIMER

The above respirator fit test was performed according to Title 8 California Code of Regulations Section 5144, Appendix "A" - Fit Testing Procedures. The above fit test was performed on and by the persons listed. The results indicate the performance of the listed respiratory protective device, as fitted on the employee named on this record under controlled conditions. Fit testing, as performed, measures the ability of the respiratory protective device to provide protection to the individual tested. The test conductor expresses or implies no guarantee that this or an identical respiratory protective device will provide adequate protection under conditions other than were present when this test was performed. Improper use, maintenance, or application of this or any other respiratory protective device will reduce or eliminate protection

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Attachment 5 - Documentation on Respirator Maintenance

Respirator cleaning procedures (Mandatory)

The primary responsibility for maintaining the respirator in proper and clean condition rests with the employee. Respirators should be cleaned after each use. The method of cleaning 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.

Procedures for Cleaning Respirators

1. 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.
2. 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.
3. Rinse components thoroughly in clean, warm (43 °C [110 °F] maximum), preferably running water. Drain.
4. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:
 - a. 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,
 - b. 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,
 - c. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.
5. 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.
6. Components should be hand-dried with a clean lint-free cloth or air-dried.

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7. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.
8. Test the respirator to ensure that all components work properly.

Storage of Respirators

1. Before you store respirators, clean them and let them dry. Store them as soon as they are dry so they don't collect dust.
2. Store clean, dry respirators in nonporous, sturdy, airtight containers, like a zip-sealed plastic bag or bin.
3. Store cleaned respirators separate from cartridges.
4. Store respirators in a cool, dry cabinet specifically designated for storage.
5. When stored, position the respirator so that it keeps its natural shape.
6. Exhalation valves and face pieces should lie in a normal position to prevent the plastic or rubber from being deformed.
7. Store respirators to protect them from dust, sunlight, extreme heat or cold, excessive moisture, and damaging chemicals.

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Attachment 6 - Field Inspection Sheet

The primary responsibility for maintaining the respirator in proper and clean condition rests with the employee. Minor repair and/or adjustment may be made on the spot; major repairs require removing respirator from service.

Inspection procedure for defects:

1. Examine the face piece for:
 - a. Excessive dirt.
 - b. Cracks, tears, holes, or physical distortion of shape.
 - c. Inflexibility of the face piece.
 - d. Cracked or badly scratched lenses in full face pieces.
 - e. Missing mounting clips, badly worn threads or missing gaskets, if required.
2. Examine the head straps or head harness for:
 - a. Breaks.
 - b. Loss of elasticity.
 - c. Broken or malfunctioning buckles in attachments.
 - d. Excessive wear on attachments.
 - e. Excessive wear on head harness which might permit slippage.
3. Examine the exhalation valve for the following after removing its cover:
 - a. Foreign material such as detergent residue, dust, or human hair.
 - b. Cracks, tears, pinholes, or distortions in the valve material.
 - c. Improper insertion of valve body in face piece.
 - d. Missing or defective valve cover.
 - e. Improper installation of valve in the valve body.
4. Examine the air purifying element for:
 - a. Correct cartridge, canister, or filter for the hazard.
 - b. Incorrect installation, loose connections, missing or worn gasket or cross threading in the holder.
 - c. Expired shelf life date on the cartridge or canister.
 - d. Cracks or dents in the outside case of the filter, cartridge, or canister.
5. If the device has a corrugated breathing tube, examine it for:
 - a. Broken or missing end connectors.
 - b. Missing or loose hose clamps.
 - c. Deterioration, determined by stressing the tube and looking for cracks.
6. Examine the harness of the front or back mounted gas mask for:
 - a. Damage or wear to the canister holder.
 - b. Broken harness straps for fastening.

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Appendices

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Appendix 1 – Respirator Training Requirements

Employer must provide employees enrolled in the Respiratory Protection Program with annual training. The training must be comprehensive, understandable, and recur annually, and more often if necessary.

The employer shall 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.
- What the procedures are for maintenance and storage of the respirator.
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
- The general requirements of CFR 1910.134.

Changes in the workplace or type of respirator render previous training obsolete.

The employer shall provide the training prior to requiring the employee to use the respirator in the workplace.

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Appendix 2 – Type of Respirators Quick Card



**Protect Yourself
Respirators**

Respiratory protection must be worn whenever you are working in a hazardous atmosphere. The appropriate respirator will depend on the contaminant(s) to which you are exposed and the protection factor (PF) required. Required respirators must be NIOSH-approved and medical evaluation and training must be provided before use.

Single-strap dust masks are usually not NIOSH-approved. They must not be used to protect from hazardous atmospheres. However, they may be useful in providing comfort from pollen or other allergens.







Approved filtering facepieces (dust masks) can be used for dust, mists, welding fumes, etc. They do not provide protection from gases or vapors. **DO NOT USE FOR ASBESTOS OR LEAD**; instead, select from the respirators below.

Half-face respirators can be used for protection against most vapors, acid gases, dust or welding fumes. Cartridges/filters must match contaminant(s) and be changed periodically.


Full-face respirators are more protective than half-face respirators. They can also be used for protection against most vapors, acid gases, dust or welding fumes. The face-shield protects face and eyes from irritants and contaminants. Cartridges/filters must match contaminant(s) and be changed periodically.

Loose-fitting powered-air-purifying respirators (PAPR) offer breathing comfort from a battery-powered fan which pulls air through filters and circulates air throughout helmet/hood. They can be worn by most workers who have beards. Cartridges/filters must match contaminant(s) and be changed periodically.

A Self-Contained Breathing Apparatus (SCBA) is used for entry and escape from atmospheres that are considered immediately dangerous to life and health (IDLH) or oxygen deficient. They use their own air tank.

For more complete information:



Occupational Safety and Health Administration
U.S. Department of Labor
www.osha.gov (800) 321-OSHA

OSHA 3093-108-0000

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Appendix 3 – Medical Clearance Requirements

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. This section specifies the minimum requirements for medical evaluation that employers must implement to determine the employee's ability to use a respirator.

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. The medical clearance shall be administered confidentially during the employee's normal working hours or at a time and place convenient to the employee.

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. The employer shall ensure that a follow-up medical examination is provided for an employee who gives a positive response to any question in the medical clearance. The follow-up medical examination shall include any medical tests, consultations, or diagnostic procedures that the PLHCP deems necessary to make a final determination.

The medical evaluation shall obtain the following information:

1. The type and weight of the respirator to be used by the employee;
2. The duration and frequency of respirator use (including use for rescue and escape);
3. The expected physical work effort;
4. Additional protective clothing and equipment to be worn; and
5. Temperature and humidity extremes that may be encountered.

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.