

Chapter 17 – Respiratory Protection

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17.1 Foreword

The County of Santa Clara is committed to maintaining an injury and illness free workplace and is making every effort to protect our employees from harmful airborne substances. Whenever it is feasible to do so, we accomplish this through engineering controls such as ventilation or substitution with a less harmful substance, and through administrative controls limiting the duration of exposure. When these methods are not adequate or impractical we provide respirators to allow employees to breathe safely in potentially hazardous environments. Our Respiratory Protection Program is designed to identify, evaluate, and control exposure to respiratory hazards. The program selects and provides the appropriate respirators; and coordinates all aspects required for proper use, care, and maintenance of the equipment.

17.2 Introduction

Many Santa Clara County employees use chemicals, products, or procedures that may generate airborne hazards. Paints, solvents, welding, printing ink, epoxies, and pesticides are a few examples.

This Respiratory Protection Program is designed to protect employees from exposure to work related airborne hazards. The Program is mandated by Cal/OSHA Sections 1531, 3409, and 5144 and is part of the County's Occupational Injury and Illness Prevention Program (IIPP).

The first half of this Chapter is for employees and managers who may be exposed to airborne hazards in their work environment. The appendices are for professionals, such as industrial hygienists and medical specialists, who are involved with related air monitoring and respirator medical examination activities.

17.3 Respiratory Protection Requirements

Cal/OSHA requires that a written program accompany the use of respirators. This document constitutes that written program. The County must also:

1. Provide respirators, at no cost, to each employee whose associated airborne hazard exposure level exceeds the Cal/OSHA limit.
2. Make the use of the respirator mandatory when conditions warrant.
3. Provide Respiratory Protection Program training to employees.
4. Provide medical examinations.
5. Provide fit testing.
6. Provide environmental monitoring.
7. Ensure the correct selection and issuance of respirators.
8. Provide for inspections, maintenance, sanitation, and storage.
9. Provide specific procedures for emergency usage.
10. Maintain records.
11. Ensure periodic program surveillance and evaluation.

17.4 Roles and Responsibilities

This section outlines the roles and responsibilities of all County employees.

17.4.1 Occupational Safety and Environmental Compliance (OSEC)

- Establishes the Respiratory Protection Program.
- Establishes a program administrator who is qualified by appropriate training to oversee the Respiratory Protection Program and conduct the required evaluations of program effectiveness.
- Oversees Respiratory Protection Program implementation, evaluation, and modification per Cal/OSHA updates.
- Contracts with industrial hygiene consultants to conduct workplace airborne hazards measurements and assessments when needed.
- Review Workers' Compensation reports on airborne hazard related loss rates and recommend corrective actions.
- Provides written recommendations to supervisors and/or agency/department heads following measurement of airborne hazards.
- Provides guidance on options for engineering and administrative controls to limit the requirement for respirator use.
- Instructs the Building Operations Department where Airborne Hazards Area signs should be posted.
- Periodically evaluates the Respiratory Protection Program.

17.4.2 Agency/Department Head

- Ensures that the County's Respiratory Protection Program is followed within their agency/department.
- Provides resources for engineering and administrative controls to limit the requirement for respirator use.
- Provides resources to implement the Respiratory Protection Program successfully.
- Ensures the implementation of the Respiratory Protection Program in his/her Agency/Department.
- Allocates enough money to line managers and first line supervisors to implement the Respiratory Protection Program fully and adequately.
- Ensures that first line supervisors receive proper training.

17.4.3 First Line Supervisor

- Immediately informs Agency/Department Safety Coordinator of any suspected airborne hazards.
- Receives the Respiratory Protection Program training.
- Informs employees of the use of engineering controls and enforces administrative controls.

- Informs new and existing employees of job-specific airborne hazards.
- Provides new and existing respirator certified employees with approved respiratory protection.
- Ensures that approved respirators and storage containers are available.
- Ensures the use of approved respiratory protection.
- Notifies each employee exposed to airborne hazards of the results of any monitoring.
- Completes the Respirator Request form (Appendix 17.17.5) and provides it to Concentra Occupational Medicine (or VHC).
- Calls Concentra Occupational Medicine (or VHC) and schedules employee(s) for a respirator medical examination.
- Annually, at a minimum, after the baseline respirator medical examination notifies employees that another exam is required.
- Informs Agency/Department Safety Coordinator of any change in the workplace that may contribute to airborne hazards.
- Provides Respiratory Protection Program records to employees upon request.

17.4.4 Employee

- Receives annual respirator medical examination and certification.
- Receives annual training on the Respiratory Protection Program and follows all guidelines for proper use, maintenance, and reporting as outlined therein.
- For all tight-fitting respirators, the employee shall perform a user seal check each time they don the respirator using OSHA-accepted negative and positive fit tests.
- If the employee detects vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece, they are to leave the respirator use area and report to their supervisor or designee.
- Cleans, disinfects (if necessary), inspects and stores the respirator in the provided container.
- Notifies his or her supervisor of concerns about airborne hazards and any adverse effects when wearing a respirator.

17.4.5 Agency/Department Safety Coordinator

- Helps supervisors implement the Respiratory Protection Program.
- Informs Occupational Safety and Environmental Compliance of any suspected airborne hazard.
- Informs Occupational Safety and Environmental Compliance of any changes in layout, equipment, and/or production that may contribute to airborne hazards.

17.4.6 Building Operations

- Posts Airborne Hazards Area warning signs as requested and required.

17.4.7 Purchasing

- Works with Concentra Occupational Health to determine which respirators are approved for County purchase.

17.4.8 Workers' Compensation

- Maintains records of occupational airborne hazard exposure injuries, illnesses, and expenses.

17.4.9 VMC Occupational Health or Concentra Occupational Medicine

- Administers, evaluates, and certifies the employee respirator medical examination.
- Evaluates and approves all respiratory protection purchased by the County.
- Ensures that respirator medical examination requirements are followed.
- Provides employees with medical treatment and/or referral as needed.
- Advises employees when an adverse medical condition is discovered.
- Maintains records of respirator medical examination, for length of employment plus 30 years.
- Maintain records of Respiratory Protection Program Training for at least 3 years.
- Trains all employees annually who are exposed to airborne hazards and must wear a respirator and ensures employee participation in such programs.
- Issues annual respirator certification card.

17.4.10 Contractors

- Comply with Cal/OSHA Section 1531.

17.5 Workplace Exposure Assessment

A workplace exposure assessment must be conducted to identify harmful airborne contaminants, their extent and magnitude, and how to control them. Employee exposure may not exceed permissible concentrations. The evaluation of the respiratory hazard(s) shall include a reasonable estimate of employee exposures to respiratory hazards and an identification of the contaminant's chemical state and physical form. Where the evaluation cannot identify or reasonably estimate the employee exposure, the atmosphere shall be considered to be immediately dangerous to life and health (IDLH). Results of these evaluations are to be documented and shared with affected employees. Additional evaluations are necessary if exposures change due to new materials, process changes, or other conditions increasing the degree of employee exposure or stress.

17.6 Types of Airborne Hazards

Airborne hazards include dusts, fogs, mists, fumes, vapors, fibers, gases, smoke, and oxygen deficient air. The level of

hazard depends on the toxicity and concentration. Associated health effects may be acute or chronic depending on substance, state, duration of exposure, and may be unique to each employee (some employees may be more sensitive to certain exposures than others).

Airborne hazards are classified according to their effect on the body. The classifications are:

17.6.1 Irritants

As the name implies, these compounds are known to produce irritation of the respiratory system. Examples are ammonia or untreated wood dust.

17.6.2 Asphyxiants

Asphyxiants are a hazard because they deprive the body of oxygen, either by displacing oxygen in the air or by chemically affecting the body. Examples are nitrogen, carbon monoxide, and carbon dioxide.

17.6.3 Anesthetics/ narcotics

These compounds are absorbed into the blood stream, where they affect the victim's mental ability. Examples are aliphatic ketones, acetylene hydrocarbons, and esters.

17.6.4 Systemic poisons

Spread throughout the body, affecting all body systems and organs, not localized in one spot or area. Examples are benzene, carbon disulfide, and lead.

17.6.5 Carcinogens

As with all carcinogens, the cancer they produce may not develop for years, even decades. Cigarette smoke and asbestos are two widely known examples.

17.6.6 Mutagens

When inhaled, mutagens can damage the genetic material of the victim's eggs or sperm, resulting in birth defects. An example is radioactive dust.

17.7 Tasks that may pose respiratory hazards

Examples may include, but are not limited to:

- Anything that produce dusts, mists, fumes, vapors, or gases. Commonly activities such as welding, grinding, painting, or sanding result in the creation of respiratory hazards.
- Operations that process, handle, store, or dispose of substances which could result in an unwanted airborne hazard, such as the use of solvents to clean parts.
- Work requiring entry into oxygen-deficient or potentially oxygen-deficient environments, such as working in confined spaces where ventilation and access are limited.
- Operations that involve open transferring, mixing, reacting, or blending of materials that release uncontrolled (or poorly controlled) aerosols, vapors, or gases. An example would be mixing a two-part system such as epoxy.

- Work in closed systems where the toxicity of the materials mandates the use of a backup exposure control strategy (where air must be monitored and a back-up breathing supply provided). This may include exposure to chemicals with poor warning properties (odorless and invisible), or chemicals that require stringent administrative controls, such as working in confined spaces and being exposed to carbon monoxide.
- Cleanup, repair, or other operations where inventorying, equipment dismantling, cleanup, or assembly may release vapors, gases, aerosols, or other air contaminants (such as asbestos) into the work environment. An example of such an operation is a changeover to a backup system. These operations may also involve oxygen-deficient air, requiring respiratory protection.
- Emergencies requiring escape from or entry into contaminated areas or areas where the concentration of air contaminants is unknown.
- Fire fighting.

17.8 Voluntary Use of Respiratory Protection in Nonhazardous Atmospheres

Supervisors may provide respirators at the request of employees or permit employees to use their own respirators in nonhazardous areas if the County determines that such respirator use will not in itself create a hazard. If the supervisor determines that any voluntary respirator use is permissible, the employer shall provide the respirator users with the following information:

INFORMATION FOR EMPLOYEES USING RESPIRATORS WHEN NOT REQUIRED UNDER THE STANDARD (8 CFR 5144, Appendix D) 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 respirator's 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.

The supervisor must establish and implement those elements of the respiratory protection program to ensure that any employee who voluntarily uses a respirator is medically able to use that respirator. They must also ensure that the respirator is cleaned, stored, and maintained so that its use does not present a health hazard to the user.

17.9 Managing Airborne Hazards

17.9.1 What you should do if you suspect an airborne hazard

Employees who suspect an airborne hazard should tell their supervisors. Supervisors who suspect an airborne hazard should:

- Take immediate steps to prevent employee exposures. If you think there is a life threatening or other serious hazard.
- Review all associated Safety Data Sheets to determine which airborne hazards may require your employees to wear respirators. A Safety Data Sheet describes the safety hazards of a chemical. You can obtain these sheets from the manufacturer or supplier.
- Contact Departmental Safety Coordinator or Safety Professional to request an indoor air quality survey.
- Ensure that conditions on the day measurements are taken are representative of typical operations.
- Comply with written recommendations after the measurements are taken. The report will indicate whether employees are to be included in the Respiratory Protection Program.

17.9.2 Controlling Airborne Hazards

Once an airborne hazard is identified, the best way to protect employees is to eliminate the hazard by using a less toxic material.

The next best way is to change the work process, contain the hazardous air, or improve the ventilation. (Changes in ventilation systems may require considerable lead time.) When these methods are not feasible, or until they are implemented and proven effective, employees must wear respirators.

17.9.3 What is a Respirator?

A respirator is a device that covers your mouth and nose to prevent the inhalation of hazardous substances. Respirators remove such substances from the air before they are inhaled or supplies an independent source of clean air.

A common misconception is that a simple dust mask will protect you from a wide variety of hazards. Although a few hazards can be reduced using a dust mask, there are a wide variety of respirators, each designed for a specific type of hazard.

These respirators must be NIOSH/MSHA approved and certified.

There are two main kinds of respirators:

- 1) Air-Purifying: As their name implies, air-purifying respirators clean contaminated air and allow employees to breathe without an additional air source. Different types of air purifying respirators can remove gas, vapor, particulates, or a combination of these. Air-purifying respirators can only be used where the air has enough oxygen to sustain life and cannot be used where contaminant concentrations exceed certain limits.

Air-purifying respirator types include:

- Chemical Cartridge
 - Protect against specific gases and vapors.
 - Purify inhaled air.
 - Provide non-emergency respiratory protection.
 - Are **not** used for extremely toxic materials, odorless materials, or eye irritants.
- Mechanical/Particulate Filter
 - Protect against airborne particulates such as dust, mist, metal fumes, and smoke. Will not protect against gases, vapors, or oxygen deficiency. (An example is a fiber-based filter that traps fine dust particles).
- Combination Filter
 - A filter that combines the function of a chemical cartridge with a mechanical/particulate filter
- Combination Mechanical Filter/Chemical Cartridge Powered Air-Purifying Respirators
 - Forces air through the filters.
 - Provide positive pressure air into face piece (face piece leakage outward).
 - Protect against gases, vapors, and particulates.

- 2) Air-supplying: These respirators provide a supply of breathable air independent of the workplace air.

- Air-line
 - Air supply must be monitored or meet Grade "D" breathing air.
 - Uses an air line connected to a remote air pump.
 - Used for specific gases, vapors, and particulates.
 - Used for escape from atmospheres immediately dangerous to life and health.
 - Never used in an oxygen deficient atmosphere, due to the risk of equipment or air line failure.
- Self-Contained Breathing Apparatus (SCBA)
 - Uses a pressurized air tank, usually worn on the back.
 - Time limited.
 - Used for escape from atmospheres immediately dangerous to life and health.
 - Used in an oxygen deficient atmosphere.
 - Air supply meets Grade "D" breathing air.

- When used in atmospheres immediately dangerous to life and health, a buddy system is required.

17.8.4 Respirator Fit

After the appropriate type of respirator is selected and the employee's ability to work while wearing a respirator has been medically approved, the County will conduct a quantitative fit test to choose the best fitting facepiece and determine the specific brand, model, and size for each employee. Quantitative fit testing numerically measures the facepiece fit. The quantitative fit test will follow the OSHA accepted protocol. Quantitative fit testing will be performed according to the attached respirator fit testing and training policy. In Santa Clara County, the Concentra Occupational Medicine (or VHC) performs respirator fitting.

17.8.5 Respirator Problems

It is important to know that respirator use can be dangerous for many reasons. If the wrong respirator cartridge is used, there is a false sense of security. Also, cartridge mask respirators strain the heart and lungs, and can harm people with medical problems. Self-Contained Breathing Apparatuses weigh 30 pounds or more and put stress not only on the heart and lungs but the back and knees as well. Proper selection, medical evaluation, and training are critical to safe respirator use.

The following list describes some of the factors that affect respirator use.

- Facial Hair: mustaches, sideburns, beards, stubble, low hairlines, or bangs that decrease the respirator-to-face seal should be trimmed or eliminated.
- Weight gain or loss: This may affect the fit of the respirator.
- Scars & Blemishes: This may affect the seal of the respirator.
- Corrective Lenses: For full-face and SCBA respirators, temple bars or straps must not pass between the face and the respirator. Therefore, if you wear glasses and you wear a full-face or SCBA respirator, you must get special corrective lenses designed to fit within your respirator.
- Facial Configuration: Due to facial size differences, supervisors should buy respirators in different sizes and, if necessary, from more than one manufacturer.
- Inhalation strength: Employees who wear respirators must be able to inhale with enough force to draw air through the cartridge or regulator. A medical professional must measure your inhalation ability before you can use a respirator.
- Medical issues: Other medical conditions may preclude the use of a respirator. Again, consult a medical professional before using a respirator.
- Communication: A respirator can make it difficult to clearly communicate to another person verbally.

In addition, you should leave the respirator-use area for any of the following reasons:

- To wash your face and respirator face pieces as necessary to prevent eye or skin irritation associated with respirator use.
- If you detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the face piece.
- To replace the respirator or the filter, cartridge, or canister elements.

17.9 Training

Once the employee is fitted with the correct respirator for the task and medically approved for its use, we want to ensure he/she is thoroughly trained in the need, use, limitations, inspection, fit checks, maintenance, and storage of the equipment. Detailed instructions for the use and care of the respirator are provided by the manufacturer and this information is to be used in the training. Ordinarily this training is initiated during the fit test; re-training shall be conducted annually.

Training Course Outline:

A . Hazard Evaluation

1. Air contaminants
2. Monitoring data review
3. Exposure consequences
4. Why the respirator is necessary
5. Limitations and capabilities of the respirator

B . Types of Respirators

1. Air purifying respirators
2. Atmosphere supplying respirators

C. Respirator Selection

1. Fit testing
2. General selection information
3. Service life of cartridges

D. Respirator Use

1. Regulatory requirements
2. Respiratory protection program
3. Inspection
4. Cleaning & Maintenance
5. Storage
6. Donning, doffing, & positive and negative fit-tests
7. Function and malfunction of respirator parts
8. Use of the respirator during emergencies

E. Factors That Affect Respirator Use

1. Facial hair
2. Eyeglasses
3. Facial deformities
4. Communications
5. Dangerous atmospheres (limitations)
6. Temperature extremes
7. Physiological responses

17.10 Selection

The selection of respirators should only be done by qualified safety professionals based on the result of hazard evaluation. The information in this section is provided for use as background information and *should not be used by non-qualified persons to select a respirator.*

17.10.1 Basic Guidelines

For oxygen deficient atmospheres, fire fighting, or a toxic contaminant that is immediately dangerous to life and health (IDLH), use a Self-Contained Breathing Apparatus (SCBA).

For other contaminants, use an air line respirator or a combination air line/air purifying respirator, or an air purifying (powered or non-powered) respirator as follows:

- For particulates: Use a dust, fume, or mist filter respirator.
- For gases or vapors: Use a cartridge or canister respirator.
- For gases or vapors with particulates: Use a cartridge or canister respirator with a particulate filter.

17.10.2 Color Code for Respirator Cartridges

Cartridges for cartridge-utilizing respirators are color coded in various ways depending on the manufacturer. Always ensure that the hazard is compatible with the cartridge and that the cartridge selected is corroborated by the color code provided by the manufacturer.

17.10.3 Selection Factors

1. The potential for oxygen deficiency.
2. Identification of the airborne hazards (type and form).
3. The range of expected airborne hazard concentration and the Permissible Exposure Limit (PEL).
4. Immediately dangerous to life or health (IDLH) concentrations for airborne hazard present.
5. The review of the mixture of different airborne hazards.
6. The physical and chemical properties of the airborne hazard
7. For flammable substances, the lower explosive limit (LEL) must be noted.
8. For gases and vapors, the odor thresholds or other warning properties should be noted.
9. The health effects or symptoms that may result from overexposure to the airborne hazard.
10. The assigned protection factor must be determined.
11. Respirators must be NIOSH/MSHA approved for the airborne hazard and conditions present.
12. Consideration to workplace environmental factors such as heat and humidity must be noted.
13. The respirator cartridge should be equipped with an end-of-service-life indicator (ESLI). This is certified by NIOSH for the contaminant. If there is no ESLI appropriate for conditions in the workplace, the County shall implement a change schedule for cartridges that is based on objective information or data that will ensure that cartridges are changed before the end of their service life. The County shall document the information and data relied upon and the basis for the cartridge change schedule and the basis for reliance on the data.

17.10.4 Prohibited uses of Chemical Cartridge Respirators

Chemical cartridge respirators should *not* be used for respiratory protections against the gaseous materials, regardless of concentration or time of exposure. Please speak to your Safety Committee team member for further information regarding this mandate.

17.11 Purchasing

Once a respirator is selected it must be ordered through County Purchasing. Respirators are provided at no cost to employees.

To order a respirator, use the Respirator Request Form at the end of this section. Attach this form to a Contract Release Form (form number 6129) available from Stores (re-order number 963008) and submit both forms to County Purchasing.

17.12 Maintenance

17.12.1 Cleaning and Disinfecting

Respirators should be cleaned after each use by the wearer. If a designee cleans the respirator, it is the wearer's duty to ensure this task has been completed adequately and effectively. Every user's respirator should bear identification, such as the user's initials or employee number. When users are assigned a respirator, they should be briefed on the cleaning procedures.

17.12.2 Repair

Most, if not all, equipment manufacturers supply literature that lists the component parts of the respirators and includes information on servicing.

Replacement parts for respirators must be those of the manufacturer of the equipment. *[Note: Substitution of parts from a different brand or type of respirator, or unauthorized modification, could decrease user protection or cause a total loss of protection and must not be done.]*

Maintenance of SCBA equipment is more difficult than maintenance of supplied air or air-purifying respirators, primarily because of the complexity of the valve and regulator assembly. Because of this, all repairs or adjustments must be done by the manufacturer, by an authorized repair facility, or by a worker who has been trained and certified by the manufacturer.]

17.12.3 Storage

The purpose of good storage is to ensure that the respirator will be clean and function properly when used. Respirators should be stored in a convenient, clean, and sanitary location, such as a plastic bag that can be sealed or in containers with tight-fitting lids.

[Note: Respirators should be thoroughly dried before being sealed in any container for storage.]

Respirators should be packed or stored so that the face piece and exhalation valves will rest in the normal position. Respirators should not be hung by their straps. This will ensure that proper function is not impaired by distortion of the respirator or its straps.

17.12.4 Field Inspection

Routinely used respirator equipment shall be regularly cleaned, inspected, and sanitized.

Air-purifying Respirators

Air-purifying respirators that are used routinely should be checked for the following elements before and after each use.

1. Face piece
 - a. Excessive dirt.
 - b. Cracks, tears, holes, or physical distortion of shape resulting from improper storage.
 - c. Lack of pliability and signs of deterioration of rubber face piece or other components.
 - d. Cracked or badly scratched lenses in full face pieces.
 - e. Incorrectly mounted full-face piece lenses or broken or missing mounting clips.
 - f. Cracked or broken air-purifying element holder(s), badly worn threads, or missing gasket(s) if required.
2. Head straps or head harness
 - a. Breaks.
 - b. Loss of elasticity.
 - c. Broken or malfunctioning buckles and attachments.
 - d. Excessively worn serrations on head harness which might permit slippage.
3. Exhalation valve (after its cover is removed)
 - a. Foreign material, such as detergent residue, dust particles, or human hair under the valve seat.
 - b. Cracks, tears, or distortion in the valve material.
 - c. Improper insertion of the valve body in the face piece.
 - d. Cracks, breaks, or chips in the valve body, particularly in the sealing surface.
 - e. Missing or defective valve cover.
 - f. Improper installation of the valve in the valve body.
4. Air-purifying element
 - a. Incorrect 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.
 - d. Expired end-of-service life indicator condition or the date the cartridge was put into service where required.
 - e. Cracks or dents in the outside case of the filter, cartridge, or canister.
 - f. Evidence of prior use of sorbent cartridge or canister indicated by the absence of sealing material, tape, foil, etc. over the inlet.
5. Corrugated breathing tube (if present on the device)
 - a. Broken or missing end connectors.
 - b. Missing or loose hose clamps.
 - c. Deterioration and/or cracks evident when the tube is stretched.
6. Harness of a front- or back-mounted gas mask
 - a. Damage or wear to the canister holder which may prevent its being held in place.

- b. Broken harness straps for fastening.

Powered Air-Purifying Respirators

A routinely used powered air-purifying respirator should be checked in the same manner as an air-purifying respirator. If the device is a hood, helmet, or blouse, the following procedures should be used.

1. The hood or blouse should be examined for rips and tears, seam integrity, etc.
2. The protective headgear, if required, should be examined for general condition with emphasis on the suspension inside the headgear.
3. The protective face shield, if any, should be examined for cracks, breaks, or impairment of vision.
4. The protective screen must be intact and secured correctly over the face shield of abrasive blasting hoods and blouses.
5. The battery pack should be checked for good physical condition and electrical connections.
6. The function of the respirator should be checked by turning the power on and:
 - a. Listening to and feeling the airflow.
 - b. Verifying proper airflow as indicated by devices from the manufacturer such as flow meters, magnehelic gauges, flow test plates, or built-in alarm systems.
 - c. Testing the alarm system if present.

Air-Line Respirators

For a routinely used air-line respirator the following procedures should be applied.

1. If the device is a tight-fitting face piece the procedures outlined under air-purifying respirators (except those procedures pertaining to the air-purifying element) should be used.
2. If the device is a hood, helmet, blouse, or full suit, the following procedures should be used.
 - a. The hood, helmet, blouse, or full suit should be examined for rips and tears, seam integrity, etc.
 - b. The protective headgear, if required, should be examined for general conditions with emphasis on the suspension inside the headgear.
 - c. The protective face shield, if any, should be examined for cracks, breaks, or impairment of vision.
 - d. The protective screen must be intact and secured correctly over the face of abrasive blasting hoods and blouses.
3. The air-supply system should be examined for the following:
 - a. Integrity and good condition of air-supply lines and hoses including attachment and end fittings.
 - b. Correct operation and condition of all regulators or flow regulators (e.g., valves).
 - c. Correct air-supply lines and hoses, including quick disconnects and end fittings, as specified by the approval label or manufacturer's instructions.
 - d. Proper air-supply line and hose length and pressure settings as indicated on the approval label.
 - e. Air quality.

Self-Contained Breathing Apparatus (SCBA)

In addition to the above face piece, head straps, and valve inspection requirements, SCBA units should be examined for the following.

1. The high-pressure cylinder of compressed air or oxygen is sufficiently charged, preferably to full capacity, for the intended use.
2. On closed-circuit SCBA, a fresh canister of carbon dioxide (CO₂) sorbent is installed.
3. On open-circuit SCBA, the cylinder has been recharged if less than 90% of the useful service time remains.
5. The regulator and warning devices function properly.
6. SCBA cylinder wrap must be in good shape. Fiber strands must not be cut or loose. Damaged cylinders must be discharged and scrapped.
7. SCBA cylinders must be hydro-tested every three years. The shop must not use a metal stamping device on the cylinder. This can ruin the integrity of the wrap.
8. All SCBA cylinders must be scrapped fifteen years after the original manufacture date.

Air-line Respirator/SCBA Combination

The air-line respirator portion should be inspected as described above. In addition, the SCBA high-pressure cylinder should be examined to verify that the cylinder is at least 90% full.

Non Routinely Used Air-Purifying or Atmosphere-Supplying Devices

When air-purifying or atmosphere-supplying devices are not used routinely, all of the above procedures should be followed for each use. OSHA requires that devices for emergency use be inspected at least monthly and that a record shall be kept of inspection dates and findings of respirators maintained for emergency use.

(See SCBA Monthly Inspection Sheet)

Inspection During Cleaning

Because respirator cleaning usually involves some disassembly, it presents a good opportunity to examine each respirator thoroughly. The procedures outlined above for a field inspection should be used. Respirators should be inspected after cleaning operations and reassembled. Field inspection procedures should be followed to examine the freshly cleaned, reassembled respirator.

17.13 MEDICAL EVALUATION

An employee's health status must be considered before allowing respirator use. Attached to this policy is a medical protocol for evaluation of workers for respirator use.

17.14 Glossary

Administrative Control The control of exposure to an airborne hazard using administrative means, such as rotating tasks to reduce the duration of exposure.

Aerosol Liquid or solid particles dispersed in a gaseous medium (air, usually); includes mists, smokes, fumes, and dusts.

ACGIH American Conference of Governmental Industrial Hygienists.

AIHA American Industrial Hygiene Association.

Air-purifying respirator A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

ANSI American National Standards Institute.

Approval Respirator certification granted by NIOSH/MSHA.

Cal/OSHA California Occupational Safety and Health Administration.

Carcinogen Cancer-producing material.

Ceiling Value Airborne concentration that shall not be exceeded during any part of the workday.

Control A method of controlling exposure to an airborne hazard.

Disposable Respirator A respirator for which maintenance is not intended and that is designed to be discarded after excessive resistance, sorbent exhaustion, physical damage, or end of service life renders it unsuitable for use.

Dust An aerosol consisting of solid particles usually produced by mechanical breakdown of bulk material.

End-of-service-life indicator (ESLI) A system that warns the respirator user of the approach of the end of adequate respiratory protection.

Engineering Control A physical means of preventing exposure that either eliminates or isolates the hazard.

Fit Check A positive or negative pressure check for proper respirator seal. This is normally done by cupping hands over the face piece, exhalation valve, or cartridges of the respirator and exhaling or inhaling sharply as directed in the fit instructions.

Fume An aerosol consisting of solid particles generated by condensation of a substance from the gaseous state. Fumes are generated by heating metals, as in welding. Paint "fumes" are actually vapors.

Gas A substance that is in a gaseous state at room temperature and pressure.

HEPA A high efficiency particulate air filter.

Immediately dangerous to life and health (IDLH) An atmosphere that poses an immediate threat to life which would cause irreversible adverse health effects or would impair an individual's ability to escape from a dangerous atmosphere.

Mist An aerosol consisting of liquid particles generated by condensation of a substance from the gaseous to the liquid state, or by breaking up a liquid into a dispersed state.

MSHA Mine Safety and Health Administration.

Negative Pressure Respirator A respirator that relies on inhalation through air-purifying elements to deliver breathable air to the user. During inhalation, air sucked into the lungs creates a negative pressure with respect to the atmosphere outside the respirator.

NIOSH National Institute for Occupational Safety and Health.

Nuisance Dust Generally innocuous dust not recognized as the direct cause of a serious pathological condition.

Odor Threshold The lowest concentration of an air contaminant that can be detected by smell.

Oxygen deficiency an atmosphere with less than 19.5% oxygen in air. An atmosphere with less than 16.5% oxygen is considered immediately dangerous to life or health.

Permissible Exposure Limit (PEL) The 8-hour average airborne concentration that OSHA deems shall not be exceeded in any 8-hour work shift of a 40-hour work week.

Positive Pressure Respirator A respirator in which normally a positive pressure is maintained inside the hood or face piece; may be an air-purifying or an atmosphere-supplying respirator.

Protection Factor A measure of the actual protection provided in the workplace when a respirator is correctly selected, fit tested, and worn; the ratio of the air contaminant concentration outside to the air contaminant concentration inside the respirator. Both concentrations are determined from samples taken simultaneously, only while the respirator is properly worn and used during normal work activities.

Qualitative Fit Test A fit test that relies on the respirator wearer's ability to sense a test agent by taste, smell, or irritation.

Quantitative Fit Test A fit test for which a respirator is worn in a test atmosphere inside a booth, instrumentation measures any leakage into the respirator.

Radionuclide A species of atom, characterized by a specific mass number, atomic number, and energy state of their nucleus, that can release alpha, beta, or gamma radiation.

Respiratory Dust -That fraction of airborne dust that is small enough to penetrate to the lungs (5-10 micron or less).

SCBA -Self-contained breathing apparatus.

Short-term Exposure Limit -The 15-minute time-weighted average exposure that shall not be exceeded at any time during a workday unless another time limit is specified in a parenthetical notation below the limit.

Threshold Limit Value -The 8-hour average airborne concentration that the ACGIH recommends not exceeding.

Time-weighted Average -The 8-hour average airborne concentration.

Vapor -The gaseous form of a substance that is normally a solid or liquid at room temperature and pressure.

17.15 Applicable Regulations

CAL/OSHA, Title 8, CALIFORNIA CODE OF REGULATIONS, Sections 1531, 3409, & 5144

U.S. Dept. of Transportation, "Shipping Container Specification Regulation", (49 CFR Part 178)

17.16 References

ACGIH, Threshold Limit Values,

AIHA, "Respiratory Protection, A Manual and Guideline", Second Edition, 1991

ANSI Z88.2, "Practices for Respiratory Protection", (1980)

ANSI Z88.5, "Practices for Respiratory Protection for the Fire Service," (1981)

ANSI Z86.1, "Compressed Gas Association, Commodity Specification G-7.1", (1973)

NIOSH, "Guide to Industrial Respirator Protection", Publication No. 87-116

NIOSH, "Respirator Decision Logic", Publication No. 87-108

17.17 Appendices

17.17.1 Appendix A: Protocol for Evaluation of Workers for Respirator Use

Santa Clara Valley Medical Center

Division of Occupational Health Services

Protocol for Evaluation of Workers for Respirator Use

Introduction

All types of respirators, both negative pressure and supplied air, can cause physiological problems even in healthy persons. Negative pressure respirators increase the work of breathing by increasing inspiratory and expiratory resistance. Supplied air respirators create increased expiratory resistance and SCBAs are heavy (20-35 lbs). Effects of wearing respirators can include strain on the heart and lungs from the increased work of breathing or weight of the apparatus, and sometimes the dead space and other changes can cause an unexpected decrease in the normally expected rise in heart and respiration rate under heavy exercise.

Because of these effects, and because we cannot predict who will get into trouble wearing a respirator, this protocol divides potential respirator users into two categories: those who will wear a respirator under non-"immediately dangerous to life and health" conditions and those who will be in IDLH atmospheres. IDLH atmospheres are those where a person will come to immediate harm if she/he pulls off the respirator under those conditions.

The Division of Occupational Medicine strongly encourages employers to train all respirator users in a non-hazardous atmosphere while performing the expected work tasks, (i.e. work simulation while wearing a respirator), before assigning them to jobs requiring respirator use. Employees should be re-screened each year. Supervisors should be alert to changes in employees health status which might affect ability to safely wear a respirator. Employees should be encouraged to report new health problems to their physicians, and to request their physicians to call the Division clinicians if they have questions between annual re-evaluations. Finally, because of the potential effects on the cardiopulmonary system, Division clinicians

will place a strong emphasis on health promotion during the medical clearance evaluation.

Protocol for Non-IDLH Atmosphere Respirator Use Medical Evaluation

1. Contents of Evaluation: 1) Medical History with careful focus on cardiovascular risk factors and exercise habits , 2) Brief exam by nurse: pulse, blood pressure, height and weight, and heart and lung examination, 3) Pulmonary function test, 4) Respiratory Protections slide/tape show, and 5) ALA respiratory protection booklet and others as appropriate (i.e. cholesterol, exercise, smoking cessation, etc. information)
2. Criteria for automatic clearance:
 - Negative for history
 - Normal for examination
 - Normal Spirometry
3. Referral to M.D. for review if any of the above criteria are not met. Physician may obtain more detailed history, perform more detailed physical examination, request information from employee's personal physician, place restrictions on employee's use of respirator and/or require exercise test or work simulation prior to clearance.
4. All charts must be signed off by attending M.D.
5. All medical information is confidential by law. The employee may have a copy of his/her record or have one sent to his/her personal physician. The employer is to be sent the medical clearance status and description of approved respirators only.

Protocol for IDLH Respirator Use

17.17.1 Appendix A: Protocol for Evaluation of Workers for Respirator Use

Medical Evaluation

1. Contents of this evaluation:

- Medical history with careful focus on cardiovascular risk factors and exercise habits.
- Examination by N.P./M.D. including pulse, blood pressure, height, weight, heart and lung exam, back range of motion and straight leg raising, reflexes and pinch test for overfat.

2. Criteria for automatic approval:

- Negative history, including age less than 40, no more than two of the following two cardiac factors:
 - Smoker within past ten years
 - Diabetic,
 - High blood pressure
 - High cholesterol (>200),
 - Sedentary (less than 20 minutes of aerobic Exercise 3 times a week)
 - Overfat
 - Family history of heart disease or stroke.
- Normal physical examination (Less than 20% overfat).
- Normal spirometry

3. Criteria for referral for exercise testing (pulmonary):

- Age 40 and over with two risk factors, or less than 40 with three risk factors.
- * NOTE: If serious concern about possible cardiac disease exists based on history and physical exam, refer to personal M.D. for thallium cardiac exercise treadmill test under personal insurance.

4. Criteria for automatic medical disqualification: Known cardiac disease, insulin dependent diabetes, active epilepsy, moderate pulmonary disease, uncontrolled high blood pressure, active drug or alcohol problem, claustrophobia, disk disease of spine or significant arthritis if SCBA use is planned.

Attending physician will make final determination in unclear cases.

It is best to err on the side of caution, requiring at least additional personal M.D. information and/or pulmonary stress test and/or work simulation test if in doubt.

5. Confidentiality, health promotion and clearance forms, per above.

17.17.2 Appendix B: Medical Questionnaire

Medical Questionnaire - Resp. Prot. Program

LAST NAME	FIRST NAME	AGE	HEIGHT	WEIGHT
ADDRESS	CITY/STATE/ZIP			PHONE
EMPLOYER	DEPARTMENT		WORK PHONE	

Medical History:

(This information is completely confidential and for review by clinic personnel only. A copy of this, your exam and test results will be given to you and/or sent to your physician at your request. Your employer will only receive a simple statement about your fitness to wear a respirator, with no medical details.)

Please answer all questions completely.

1. Have you ever had or been treated for:

Respiratory Problems:	Yes	No
asthma	___	___
bronchitis	___	___
emphysema	___	___
chronic cough	___	___
shortness of breath	___	___
other lung problems	___	___
Heart Problems:		
heart disease	___	___
coronary disease	___	___
high blood pressure	___	___
chest pain, pressure on exercise	___	___
family history of heart problems	___	___
Other Health Problems:		
diabetes	___	___
epilepsy	___	___
serious arthritis	___	___
back/joint problems	___	___
claustrophobia	___	___
severe acne	___	___
no sense of smell	___	___
overweight	___	___
high cholesterol	___	___
Have you ever had it checked? _____		
smoking cigarettes	___	___
# years _____	Packs/day _____	

2. Do you exercise regularly? ___ If yes, number of times per week ___ Per month ___
Kind of exercise: _____

3. Do you take any medications? ___ If yes, please list kind of medication and what it is for: _____
4. Have you seen a doctor for any reason in the past year? ___ If yes, please indicate reason. _____
5. Have you had any serious head or chest injuries? ___ If yes, please describe: _____
6. What type(s) of respirator will you be wearing?
 - ___ Cartridge (mask with filters)
 - ___ Airline (mask with hose)
 - ___ Self contained Breathing Apparatus (SCBA-mask with air bottles)
7. Will you be wearing other protective clothing with the respirator? (check all)
 - ___ gloves
 - ___ protective apron
 - ___ other: _____
 - ___ chemical suit
 - ___ goggles
8. Approximately how often do you expect to be using a respirator?
 - ___ Daily
 - ___ Weekly
 - ___ Monthly
 - ___ Less than once a month
9. When you are working and wearing a respirator, are your work tasks:
 - ___ Sedentary (quiet, mostly sitting, light work)
 - ___ Moderately strenuous (medium work)
 - ___ Heavy (work up a sweat)
 - ___ Very strenuous (very heavy)

I understand that omissions or false answers to the above questions may result in my being placed in a dangerous position (to myself and others) because I might be medically cleared for work that I am physically unable to perform safely. I hereby state that I have answered the questions of this medical questionnaire to the best of my knowledge.

SIGNATURE _____

DATE _____

17.17.3 Appendix C: Respirator Fit Testing and Training Policy for

Division of Occupational Medicine and Employee Health Services

Respirator Fit Testing and Training Policy

I. General Policy

The Division of Occupational Medicine bases its procedures and protocol for respirator fit testing on guidelines developed by the American National Standards Institute and is in compliance with Cal OSHA GISO 5144 and Federal OSHA General Industry Safety Standards 1910.137 on Respiratory Protection. In order to assure compliance with ANSI standards, general prerequisites must be met before respirator fit testing and selection can be conducted:

- A. Individuals must receive medical clearance by a physician, documenting that the person is physiologically and psychologically capable of wearing respiratory equipment, without risk or undue discomfort. This clearance must be based on the Valley Medical Center protocol on pages 14 to 15 and may be performed by corporate medical staff, an outside physician, or contracted with us.
- B. Individuals with facial hair and certain facial deformities will not be fit tested, as there is no way to provide an adequate fit. Mustaches which do not interfere with face piece to face seal are acceptable. (A diagram showing acceptable types of facial hair is attached.)
- C. Our basic evaluation identifies only the types of respirators which provide the best face piece protection factor for the individual worker. (Face piece protection factor: is the ratio of ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer.)

Determination of the types of cartridges to be used with the respirator and the frequency of changing cartridges is the responsibility of the employer, based on industrial hygiene evaluation of the workplace contaminants and their concentration in the air.

II. Respirator Fitting Protocol

Respirator fit testing determines the size, brand, and style of respirator that will provide the highest protection factor. As outlined below, a single, billable respirator fit test is comprised of qualitative and quantitative evaluations in conjunction with training for proper use and maintenance of one's respirator.

A. Quantitative Respirator Fit Test

A quantitative test is performed using a quantitative fit testing chamber with a corn oil aerosol. The equipment and procedure are in accordance with standards described in ANSI 288.2-1980 appendix A6. For workers exposed to OSHA regulated hazards whereby the statute requires a quantitative fit test, 3 additional fit tests shall be carried out on a selected respirator, and the lowest face piece protection factor will then be assigned.

B. Basic Training on Respiratory Usage

A general orientation on the use of respirators is conducted during the fit test procedures. This training session runs approximately 20 minutes and includes a slide tape show and hands-on training such as donning the respirator, valve inspection, etc.

C. Written Educational Materials on Respirator Use

Occupational lung hazards will be given to each person tested.

III. Medical Assessment to Determine Respirator Usage

Medical assessment will be performed either by a company's medical staff, an outside physician or can be contracted additionally through Occupational Medicine. The medical screen involves a brief questionnaire to identify heart, lung and other diseases which could make wearing a respirator dangerous, and a physical evaluation including heart and lung sounds, blood pressure

17.17.3 Appendix C: Respirator Fit Testing and Training Policy for

measurement, and spirometry. An individual's physical fitness to wear a respirator will then be assessed according to the medical protocol.

IV. Record Keeping

Record keeping of fit test results includes the information stipulated in section 6.12 of the ANSI standard: Consent to Treat Statement, Medical Questionnaire, Physical Assessment, Quantitative Test Record, and Strip Chart Recording and Cover Letter. This information is filed in our Medical Records Department in accordance with our institutional policy.

V. Confidentiality of Information

Individuals and their employers will be given authorization statements with the results of the fit testing. If an individual is medically screened by us, he or she has access to the medical information, but employers will only be notified whether or not the employee is medically cleared to wear a respirator.

17.17.4 Appendix D: Respirator Employee Handout

To Whom It May Concern:

On the date of your appointment for Respirator Fit testing, we require that you not smoke for one hour prior to your appointment.

Please reschedule if you are or have been ill with a respiratory illness within the last three weeks.

You may not be fitted if you have facial hair that will impede the seal of the mask to your face, (see below).

If you have any questions, please call the US HealthWorks at (408) 773-9000 or Occupational Medicine Clinic at (408)-885-5920 for VMC employees.

O = Acceptable hair lengths for respirator use

X = Unacceptable

17.17.5 Appendix E: Respirator Request Form

Respirator Request Form

Use this form if you are concerned that an airborne hazard may exist in your work site. Send this form to Occupational Safety and Environmental Compliance, which will administer a hazard evaluation. If a hazard is confirmed, the supervisor will send the affected employee(s) to Concentra Occupational Medicine or VMC for fit testing.

Employee and Usage Information (to be filled out by employee or supervisor)

Date _____ Name _____
Department/Agency _____
Location _____ Supervisor _____ Phone # _____

Possible Airborne Hazards (Check all that apply, remember to review MSDS)

Asbestos Organic Vapors Toxic Metals
 Acid/Mist Toxic Gases Nuisance Dust Other(s): _____

Respirator Usage (Check all that apply)

Emergency Maintenance Lab Work Chemical Waste Handling
 Spray Painting Welding Routine Operations Other(s): _____

Estimated Respirator Usage Time: Hours _____ Per Day _____ Per Week _____ Per Month _____

Medical Surveillance Physician Statement (to be filled out by US HealthWorks or Valley Medical Center)

Employee: _____ was seen on _____ for an annual/periodic medical surveillance examination in accordance with the requirements of OSHA's standards.

- Medically cleared for respirator use
 Fit tested. Recommended respirator is : _____
 Not medically cleared for respirator use.
 Unable to fit for facial structure.
 Medically cleared for respirator use with the following restrictions:

The employee has been informed by the examining clinician of the results of the examination and of any medical conditions that require further explanation or treatment. Any specific findings or diagnosis were referred to the private medical doctor for appropriate treatment. These medical findings will not be revealed in this letter of results, as mandated by law.

Attending Physician Examining Clinician Date

Fit Testing Information (to be filled out by US HealthWorks or Valley Medical Center)

Respirator Manufacturer _____ Model # _____

Size _____ Cartridge Type(s) _____

Qualitative Fit Test Material _____

17.17.5 Appendix E: Respirator Request Form

Signature (Fit Tester) _____ Date _____

17.17.6 Appendix F: NIOSH Designations for Filters (42 CFR 84)

THE NEW NIOSH DESIGNATIONS FOR FILTERS (42 CFR 84)

Code Letters N – Not for oil mists R – Resistant to Oil (good for a single shift) P– Oil-Proof (good for use with oily mists, and over several shifts) Filter Designations

	N	R	P
95%	N95	R95	P95
99%	N99	R99	P99
99.97%	N100	R100	P100

1. Filter or prefilter labeled N95 may be used for:
 - Non oily dusts, fumes, mists
 - Most metal welding fumes
 - Airborne dusts (non oily)
 - Sawdust
 - Nuisance dusts
 - Water-based pesticide mists *
 - Paint Spray Mists (Enamel and water base paints) *
2. Filter or prefilter labeled R95 or P95 may be used for oily mists to include:
 - Lubricant oil mists
 - Cutting oil mists
 - Glycerine mists
 - PCBs *
 - Triphenyl phosphate
 - Asphalt fumes
 - Oil/solvent-based pesticides *

17.17.6 Appendix F: NIOSH Designations for Filters (42 CFR 84)

- Coal-tar pitch volatiles *
 - Coke oven emissions
 - Paint spray mists (oil-based paints) *
3. Filter or prefilter labeled N99 may be used for:
 - Tuberculosis germ exposures
 4. Filter or prefilter labeled N100 may be used for:
 - Asbestos dusts
 - Lead dusts and fumes
 - Cadmium dusts and fumes
 5. Filter or prefilter labeled P100 may be used for:
 - Radionuclides and radioactive dusts

*** When used in conjunction with an appropriate chemical cartridge.**