

California Institute of Technology

**RESPIRATORY PROTECTION
PROGRAM**



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RESPIRATORY PROTECTION PROGRAM

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PURPOSE

The purpose of the Respiratory Protection Program is to ensure protection to Institute employees from inhalation of harmful substances. Respirators may be necessary in some situations when effective engineering controls are not feasible. This Program complies with Title 8 of the California Code of Regulations, § 5144, Respiratory Protection.

SCOPE

This Program applies to all Institute faculty, staff, and students who are required to wear respirators during normal and non-routine work operations.

RESPONSIBILITIES

SUPERVISORS

The Supervisors' responsibilities under the Program include:

- Identifying employees and students subjected to hazardous conditions that may require the use of a respirator;
- Ensuring affected employees are aware of specific respirator requirements in their area;
- Ensuring employees comply with the Program requirements;
- Making respirators available for authorized users; and
- Ensuring that training is administered to respirator users.

RESPIRATOR USERS

Respirator Users' responsibilities under the Program include:

- Completing the appropriate medical evaluation, training, and fit testing;
- Ensuring that the respirator is properly maintained, cleaned, and stored;
- Wearing the respirator in an appropriate manner;
- Reporting any problems associated with wearing the respirator to his/her Supervisor;
- Inspecting the respirator before each use; and
- Reporting any malfunction of the respirator to his/her Supervisor.

ENVIRONMENT, HEALTH, AND SAFETY

The Environment, Health, and Safety Office (EHS) oversees the Respiratory Protection Program. EHS's responsibilities under the Program include:

- Performing hazard assessments;
- Selecting and issuing suitable respiratory protection options;
- Conducting training and fit-testing;
- Maintaining training and fit testing records; and
- Evaluating the effectiveness of the Program.

LICENSED HEALTH CARE PROFESSIONAL (PLHC'P):

Pasadena Community Urgent Care and St. George's Medical Center are Caltech's occupational health providers responsible for:

- Performing medical evaluations using a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire;
- Performing necessary follow-up examinations to determine ability to wear a respirator;
- Providing a written evaluation of the employee's ability to use a respirator to Caltech's EHS Office; and
- Maintaining records of such evaluations.

RESPIRATOR SELECTION

Caltech's EHS Office determines the type of respirator necessary for a given task. The decision is based on a hazard assessment of the task. The hazard assessment takes into account the expected chemical hazard, exposure levels, and engineering controls in place.

Respirator selection considers these elements:

- Effectiveness of the device against the substance(s) of concern;
- Estimated maximum exposure concentration;
- General environment;
- Known limitations of respirators; and
- Comfort, fit, and worker acceptance.

Only respirators certified by the National Institute for Occupational Safety and Health (NIOSH) will be issued. (See [Appendix A – Respirator Selection](#)).

A number of respirator sizes and models are provided through EHS for selection purposes. Respirators may be filtering facepieces (dust masks), half or full-face air purifying respirators, powered air purifying respirators (PAPR), supplied air respirators, or self-contained breathing apparatus (SCBA) (See [Appendix B – Types of Respirators](#)). When recommending an air-purifying respirator, the appropriate filter types will be selected. Cartridge change schedules will be issued as appropriate. Respirator selection is documented. Departments purchase and maintain appropriate respirators and supplies. Respirators, replacement cartridges, and filters can be obtained from the EHS Office.

MEDICAL EVALUATION

Employees are not allowed to wear respirators unless they are physically able to perform their work while wearing the equipment. A licensed health care professional from one of the Caltech occupational health providers determines respiratory protection restrictions, if any, based on the individual's physical status through a medical questionnaire that employees submit online, supplemental information provided by the Institute, and medical tests, as appropriate. The occupational physician, in accordance with OSHA medical surveillance requirements, determines specific medical tests and procedures. Tests and procedures will be reviewed periodically. Follow-up medical examinations shall be provided for an employee whose initial medical questionnaire or medical examination demonstrates the need for a follow-up medical examination. Supplemental information provided to the health care professional by the Institute includes:

- The type and weight of the proposed respirator;
- The duration and frequency of respirator use;
- The expected physical work effort;
- Additional protective equipment and equipment to be worn; and
- Temperature and humidity extremes that may be encountered.

The health care professional will provide the Institute and employee written recommendations regarding the employee's ability to use a respirator.

Future evaluations are made when there is a change to workplace conditions increasing an individual's physiological burden, the user reports related medical signs or symptoms, or if there is a recognized need for reevaluation.

Medical evaluations are not required to include those employees whose only use of respirators involves the voluntary use of filtering facepieces (dust masks) in a written Respiratory

Protection Program. (See [Appendix E](#) – *Information For Employees Using Respirators When Not Required Under The Standard*).

TRAINING

Individuals required to wear respirators must receive training and fit testing prior to using the respirator (See [Appendix C](#) – *Training and Fit Testing Record*).

The training program includes:

- Respiratory hazards to which employees are potentially exposed during routine and emergency situations;
- Elements of the program;
- Need for respiratory protection;
- Use and limitations of respiratory protection;
- User responsibilities;
- Medical surveillance;
- Maintenance and storage; and
- Medical signs and symptoms limiting the effective use of respirators.

Retraining is administered annually as well as in response to changing conditions or other indications. Training completion is documented by the EHS Office.

FIT TESTING

Individuals required to wear respirators must be properly fitted and tested to ensure an adequate seal prior to initial use. Respirator Fit Testing and Training are provided upon the successful completion of the Respirator Medical Evaluation. This Training, also known as “fit testing,” is provided through the EHS Office. The employee or his/her Supervisor should arrange with EHS for an appointment for Respirator Training. Employee shall follow fit testing guidelines as outlined in [Appendix F](#) – *Respirator Fit Testing Guidelines*.

Fit tests are a determining factor in the type, model, and size selection of respirators. The EHS Office performs fit testing to certify the ability of the user to obtain a satisfactory fit. Users must pass the fit test before final issuance of a respirator. Instructions for performing fit checks in the field are provided to users (See [Appendix D](#) – *Respirator Fit Checks*). Additional fit testing is conducted annually and whenever there are changes in the users’ physical condition that could affect respirator fit.

MAINTENANCE AND USE

Inspection, Cleaning, and Repairs

Users who have facial hair or a condition that interferes with the face-to-facepiece seal or valve function cannot wear fitting respirators.

- Personal protective equipment (e.g., safety glasses) must not interfere with the seal of the facepiece to the face of the user.
- Fit checks must be performed prior to each use of a tight-fitting respirator.
- Respirators must be cleaned and disinfected as often as necessary to maintain a sanitary condition. Shared respirators require cleaning and disinfecting prior to each use by a different individual. Emergency respirators must be cleaned after each use.
- Store respirators in a sealed container when not in use. Do not store in such a way that the natural shape of the respirator becomes distorted.
- Respirators shall be inspected before each use and during cleaning. Respirator inspections shall be checked for function, tightness of connections, and the condition of

the various parts including, but not limited to, the facepiece, head straps, valves, connecting tube, and cartridges, canisters or filters; and a check of elastomeric parts for pliability and signs of deterioration.

- Respirators that fail an inspection or are otherwise found to be defective are to be removed from service.

Respirator Selection and Cartridge Change Schedule Summary

A. General

This section describes details of the procedures for respirator selection and use at Caltech.

B. Respirator Selection

Based on identified hazards, the Program Administrator shall maintain and issue respiratory protective equipment when required by Caltech or used voluntarily (except filtering facepieces and PAPRs). Respirators, cartridges, filters and other components shall be National Institute for Occupational Safety and Health (NIOSH) certified. A variety of models and sizes of respirators shall be available to offer employees a choice of equipment, so that the respirator they select is comfortable and provides an acceptable fit.

C. Filter and Cartridge Service Life

Filters and cartridges must be used according to certain conditions in order to ensure that they continue to provide the intended protection.

D. Particulate filters

Particulate filter change in the absence of oil aerosols will be required when the user detects increased breathing resistance, or the filter becomes soiled or damaged. Where a particulate filter is used in an environment with oil aerosols, the manufacturer's recommended service life for their P-series filters will be used. Should R-series filters be used in an oil aerosol environment, the filter will be discarded after 8 hours of use.

End-of-Service Life Indicators (ESLI)

When appropriate NIOSH-certified cartridges with ESLI are available to protect against a workplace contaminant, the ESLI may be used as an indication that the cartridge is no longer adequate for employee protection.

Cartridge Change Schedules

The workplace will be assessed for contaminant concentrations as part of the Hazard Evaluation. When the contaminants include gases and vapors, the Industrial Hygienist will provide cartridge change information to the respirator user or group of users, for each task requiring respiratory protection. Cartridge change schedules will be created based on calculated cartridge service life, taking into consideration the nature of the contaminant or mixture of contaminants, the accuracy of the workplace concentration measurements, the presence of other organic vapors, the possibility of high relative humidity, potential for cartridge bed migration, warning properties of the contaminant, and any other factors found to be important in the hazard assessment. Where possible, cartridge change schedules will be developed using the manufacturer's service life calculators.

Service life will be calculated using the following guidelines:

- **Exposure Level:** The established Occupational Exposure Limits (OELs), usually OSHA Permissible Exposure Limits (PELs), or American Conference of Governmental Industrial Hygienists (ACGIH). Threshold Limit Values (TLVs) when they are more restrictive will be used for calculation of the cartridge service life.
- **Breakthrough Level:** In using the manufacturers' service life calculators the allowable breakthrough concentration shall be 50% of the exposure limit, unless the contaminant concentration is less than ten times the exposure limit, in which case the allowable breakthrough concentration shall be 10% of the concentration.
- **Safety Factor:** A safety factor of 50%, or as determined by the Industrial Hygienist, shall be employed for calculations.
- **Work Environment:** Additional parameters such as work rate, temperature, and relative humidity, shall be entered according to the work and the work environment.
- **Low Boiling Point Organic Vapors:** Cartridge bed migration may result in contaminant desorption and migration, even when there is no additional exposure to the contaminant.

Where the contaminant's boiling point is less than 65 degrees Celsius, cartridges should be changed after every work shift where exposure occurs, or more frequently if the service life calculation indicates this is necessary. Workers should be educated about the chemical properties of contaminants they work with. For contaminants with boiling points slightly greater than 65 degrees Celsius, cartridge change frequency may be determined in consultation with the Industrial Hygienist, based on the nature of the contaminant and the work environment.

- **Warning Properties:** Contaminant warning properties are not a reliable measure of cartridge functioning and should not be used to determine the cartridge service life.

However, workers should be educated about the contaminant warning properties for the contaminants to which they may be exposed. Warning properties include odor, taste, irritation, burning, and any other indication the contaminant may be present in the air.

APPENDIX A: RESPIRATOR SELECTION

Department and/or Operation	Air Contaminants	Exposure Level (8-hr TWA)	Change-out Schedule	Respirator Type	Controls
Biology	Isoflurane	Monitoring doesn't show exposures	Change every 3-4 months (per published research)	3M Half Face with OV/AG/P100	Training Ventilated rooms Procedures for the use of Isoflurane
OLAR	Biohazard/ animal dander		Disposable N95 for the biohazard	Filtering Face pieces/ N95	Training Ventilated rooms Procedures for the use of biohazards
Central Plant	Asbestos	Waiting on results	Change filters when first experience difficulty breathing (i.e., resistance) while wearing the respirator and after each use. Whichever comes first.	3M Half Face with OV/AG/P100	Training
Central Plant	Chlorine	Personal monitoring shows no detect for Chlorine	Once a year	3M Half Face with OV/AG/P100	Training Outdoor activity
Chemical Engineering	Hydrofluoric (HF) Acid	STEL: 0.77 ppm, below allowable exposure limit	Once a year	3M Half Face with OV/AG/P100	Training Chemical is used in a fume hood
Facilities / Paint Shop	Paint	NO REPORTABLE HAZARDOUS INGREDIENTS	Change filters when first experience difficulty breathing (i.e., resistance) while wearing the respirator and after each use. Whichever comes first.	3M Half Face with OV/AG/P100	
Facilities / Paint Shop	Paint used to coat/spray in paint booth and Shop	Waiting on results		3M Half Face with OV/AG/P100	Training Spray booths have built in ventilation systems that provide fresh air in the booth while venting out hazardous substances
Facilities / Paint Shop	Lead	Personal monitoring shows no detect	Once a year		Training

Engineering and Applied Sciences/ Gharib Group	Nanoparticles (carbon nanotubes)	Personal monitoring shows no detect	Once a year	3M Half Face with P100	Material is wet, in a fume hood, covered when transferred, procedures for the use of nanomaterial Training
PMA	First Contact		Twice a year	3M Half Face with OV/AG/P100	Training
Facilities Management	Asbestos	Waiting on results	Change filters when first experience difficulty breathing (i.e., resistance) while wearing the respirator and after each use. Whichever comes first.		Training
Palomar Observatory	Acids	Used once a year	Change filters after each use.	3M Half Face with OV/AG/P100	Procedures for the use of acids Training
Engineering and Applied Sciences / Atwater Group	Vanadium pentoxide V2O5 in sputtering system	Personal monitoring shows no detect	Once a year	Filtering Face piece/ N95	

- For protection against gases and vapors, Caltech's EHS Office provides air-purifying respirators.
- For protection against particulates, Caltech's EHS Office provides air-purifying respirators equipped with a filter certified by NIOSH as a high efficiency particulate air (HEPA) filter, or an air-purifying respirator equipped with a filter certified for particulates by NIOSH.
- Employees wearing APRs or PAPRs with only P100 filters for protection against particulates need to change the filters on their respirators when they first begin to experience difficulty breathing (i.e., resistance).

PROGRAM EVALUATION

Caltech's EHS Office will periodically evaluate the effectiveness of the Program through workplace evaluations and consultation with respirator users.

RECORDKEEPING

Caltech's EHS Office maintains records of hazard assessments, training, and fit testing. The occupational physician maintains medical records.

APPENDIX B: TYPES OF RESPIRATORS

Different types of respirators are designed to protect against specific respiratory hazards. The atmosphere and the air contaminant levels that workers encounter at work dictate the type of respirator that must be worn.

Respirators are available in many types, models, and sizes from several manufacturers for a variety of applications. Described below are two major types of respirators: air-purifying respirators and atmosphere-supplying respirators.

AIR-PURIFYING RESPIRATORS

Air-purifying respirators work by removing gas, vapor, particulates, or combinations of gas, vapor, and/or particulates from the air through the use of filters, cartridges, or canisters. To help employees with identifying the specific chemicals that the cartridges are designed for, all filters, cartridges, and canisters must be labeled and color-coded with an approval label provided by the National Institute of Occupational Safety and Health (NIOSH).

Examples of air-purifying respirators include:

- *Filtering facepiece respirators*, which are often called dust masks.
- *Tight-fitting respirators*, which have either a half mask or a full facepiece.
- *Powered Air-Purifying Respirators (PAPRs)* which have a hood, a helmet, a tight-fitting facepiece, or a loose-fitting facepiece.
 - PAPRs have a battery powered blower to supply purified air.

Air-purifying respirators not designed for use in conditions that are Immediately Dangerous to Life or Health (IDLH) and must not be used when entering an area that is oxygen deficient ($O_2 < 19.5\%$ by volume). IDLH is a term that is used to describe an atmosphere that poses an immediate threat to life, which would cause irreversible adverse health effects or that would impair a person's ability to escape from a dangerous atmosphere.

ATMOSPHERE-SUPPLYING RESPIRATORS

Instead of filtering out contaminants, as air-purifying respirators do, atmosphere-supplying respirators work by providing clean breathing air from an uncontaminated source. These respirators consist of a hood, a helmet, a tight-fitting closed-circuit type facepiece, or a loose-fitting open-circuit type facepiece. The breathing air is supplied by a compressor or a pressurized cylinder.

Examples of atmosphere-supplying respirators include:

- *Supplied-Air Respirators (SARs)*, which provide breathing air through an air line from a source outside the contaminated work area.
- *Self-Contained Breathing Apparatuses (SCBAs)*, which allow the user to carry a pressurized (compressed) breathing air cylinder.
- *Combination respirators*, which are SARs that have an auxiliary SCBA that is used to escape from a hazardous environment.
- *Escape-only respirators*, which are intended for use only during an emergency exit.
- Escape-only respirators cannot be used to enter an area that has a hazardous atmosphere.

Continuous flow and pressure demand respirators belong to different classes of atmosphere-supplying respirators. The continuous flow feature provides a continuous flow of breathing air to the respirator inlet covering. The pressure demand feature admits breathing air to the facepiece when the positive pressure inside the facepiece is reduced by inhalation.

Atmosphere-supplying respirators are mostly used in high hazard atmospheres. High-hazard atmospheres can be encountered during emergency situations, chemical spills, very high concentrations of air contaminants, or the use of materials that have poor warning properties.

Atmosphere-supplying respirators must also be used in the following situations:

- In atmospheres for which there are no approved cartridges (e.g., in an atmosphere where methylene chloride is present).
- During certain welding operations that involve toxic metals.
- During procedures that involve abrasive blasting.
- When escaping from a hazardous environment.
- In oxygen-deficient atmospheres.
- In conditions that are IDLH.

NEGATIVE- AND POSITIVE-PRESSURE RESPIRATORS

Both air-purifying respirators and atmosphere-supplying respirators may be further classified on the basis of their functioning as either negative-pressure respirators or as positive-pressure respirators.

Negative-pressure respirators are tight-fitting respirators that work by creating pressure differences between the volume of air inside and outside the respirator. As the wearer of a respirator breathes in, the pressure inside the facepiece is reduced, which forces air from outside the facepiece to be pulled through the inlet covering, to replace what was inhaled. Types of negative-pressure respirators include filter facepiece “dust masks”, half masks, and full-facepiece, air-purifying respirators.

Positive-pressure respirators are respirators that have a breathing air source that pushes air through the inlet covering of the respirator. The pressure inside the respirator exceeds the air pressure outside the respirator.

Supplied-air respirators provide breathing air independent of the environment. This type of respirator may be selected for conditions where:

- A contaminant does not have sufficient warning properties, or
- The concentration of a contaminant is beyond the design of an air-purifying respirator.

This type of respirator is acceptable for oxygen deficient atmospheres. Classifications of supplied-air respirators are:

- **Demand:** Air is supplied to the user during inhalation (demand) which creates negative pressure in the facepiece. Leakage into the facepiece is possible if there is a poor respirator-to-face seal.
- **Pressure-Demand:** A continuous positive pressure is maintained within the facepiece. This positive pressure prevents any leakage into the facepiece.
- **Continuous Flow:** A continuous flow of air is maintained through the facepiece. This continuous flow prevents any leakage into the facepiece.

SELF-CONTAINED BREATHING APPARATUS (SCBA)

This type of respirator provides independence from a fixed source of air. The classifications for SCBA are the same as supplied-air respirators.

ASSIGNED PROTECTION FACTORS

Different types of respirators have different limits on how effective they are in protecting against air contaminants. The Assigned Protection Factor (APF) of a respirator reflects the level of protection that a properly maintained and functioning respirator can be expected to provide to a population of properly fitted and trained users.

Different types of respirators have different APFs. Tight-fitting, half-mask, air-purifying respirators have the lowest APF, and SCBAs have the highest protection factor. An APF of 10 means that the concentration of air contaminants inside the respirator facepiece is reduced by a factor of 10.

The Institute relies on APFs published by NIOSH and the American National Standards Institute (ANSI). Cal/OSHA has enforceable APFs that are contained in substance-specific health standards.

Table 1. - Assigned Protection Factors ⁵

Type of respirator ^{1,2}	Quarter mask	Half mask	Full facepiece	Helmet/hood	Loose fitting facepiece
1. Air-Purifying Respirator	5	³ 10	50	.....	.....
2. Powered Air-Purifying Respirator (PAPR)		50	1,000	⁴ 25/1,000	25
3. Supplied-Air Respirator (SAR) or Airline Respirator					
Demand mode	.....	10	50	.....	.....
Continuous flow mode	.....	50	1,000	⁴ 25/1,000	25
Pressure-demand or other positive-pressure mode	.....	50	1000	.....	.....
4. Self-Contained Breathing Apparatus (SCBA)					
Demand mode	.....	10	50	50	.....
Pressure-demand or other positive-pressure mode (e.g., open/closed circuit).	.....	.....	10,000	10,000	

Notes:

1. Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.

2. The Assigned Protection Factors in Table 1 are only effective when the employer implements a continuing, effective respirator program as required by this section, including training, fit testing, maintenance, and use requirements.
3. This APF category includes filtering facepieces, and half masks with elastomeric facepieces.
4. The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a Workplace Protection Factor (WPF) or simulated WPF study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.
5. These APFs do not apply to respirators used solely for escape. For escape respirators used in association with substances covered by substance-specific standards in Title 8, Division 1, Chapter 4, Subchapters 4, 7, and 18, employers must refer to the appropriate substance-specific standards. Escape respirators for other IDLH atmospheres are specified by subsection (d)(2)(B).

Cartridge and Canister Warning Systems

The useful service life of a cartridge or canister is defined by how long it provides employees with adequate protection from harmful chemicals in the air. The service life of a cartridge depends on many factors, including environmental conditions (e.g., high humidity), breathing rate, cartridge capacity, the amount of contaminant in the air, and how many hours the cartridge is used.

For air-purifying respirators that protect against gases and vapors, a system must be in effect that will reliably warn respirator wearers of contaminant breakthrough. These systems include an End-of-Service-Life Indicator (ESLI) or an established and enforced cartridge or canister change schedule. Some cartridges and canisters are equipped with an ESLI system that warns the user of the end of adequate respiratory protection. The indicator is usually a sorbent material that changes color when the cartridge approaches saturation or is no longer effective. However, few cartridges are currently equipped with an ESLI. In this situation, a cartridge or canister change schedule will be developed and provided to the respirator user.

- **ALWAYS FOLLOW THE MANUFACTURER'S INSTRUCTIONS WHEN DETERMINING PROTECTION FACTORS.**
- **NO RESPIRATORS ARE APPROVED FOR ATMOSPHERES WHERE AIRBORNE CONCENTRATIONS MAY EXCEED 25% OF THE LOWER EXPLOSIVE LIMITS.**

APPENDIX C: TRAINING & FIT TESTING RECORD

Name _____ Date _____

Department _____

Respiratory Hazards _____

I. Respirator Type

- | | | |
|--------------------------------------------------|----------------------------------------------|--------------------------------|
| <input type="checkbox"/> ½ Face Air Purifying | <input type="checkbox"/> Filtering Facepiece | |
| <input type="checkbox"/> Full Face Air Purifying | <input type="checkbox"/> Full Face PAPR | |
| <input type="checkbox"/> Full Face Supplied Air | <input type="checkbox"/> Full Face SCBA | |
| <input type="checkbox"/> Other _____ | | |
| <input type="checkbox"/> 3M | <input type="checkbox"/> Moldex | |
| <input type="checkbox"/> North | <input type="checkbox"/> Wilson | |
| <input type="checkbox"/> Other _____ | | |
| <input type="checkbox"/> Small | <input type="checkbox"/> Medium | <input type="checkbox"/> Large |

II. Training

III. Qualitative Fit Test

TEST:

Negative Fit Test

Positive Fit Test

Sensitivity Test:

Isoamyl Acetate

Saccharin #Squeezes: 10 20 30

Fit Test:

Isoamyl Acetate (Organic Vapor Filter)

Saccharin (Particulate Filter)

RESULTS:

Pass Fail N/A

Comments:

Repeat Fit Test Before: _____

Test Conductor: _____ Employee Signature: _____

.....

PTA Account: _____

Date Billed _____

Amount: _____

Entered into database _____

TRAINING REVIEW GUIDELINES

This respirator has been issued to you for a specific airborne contaminant. **IT WILL NOT PROTECT YOU FROM OTHER CONTAMINANTS.**

The following are reminders of the instruction you have received:

MAINTENANCE check before each use:

- a) Sealing surface clean and free of cracks and holes.
- b) Inhalation and exhalation valves are clean and seated properly.
- c) Straps are sufficiently elastic and free of worn areas.

CHECK OF PROPER FIT AND FUNCTION prior to each use:

- a) Positive pressure user seal check (Close off exhalation valve and exhale).
- b) Negative pressure user seal check (Close off cartridges and inhale).

CLEAN MASK ON A REGULAR BASIS with a mild soap and warm water solution and allow it to air dry overnight. (Make sure the cartridges / filters are removed from the respirator before cleaning).

STORE respirators and filter cartridges in Ziploc storage bags, or other protective enclosure, away from excessive heat sources, contaminated work areas, and harsh chemicals.

DO NOT STORE items on top of respirator which could deform the facepiece shape.

Be familiar with **CHEMICAL PROPERTIES** of the substance you are using the respirator to protect yourself from. Some chemicals require the cartridges to be changed every 4-8 hours, regardless of exposure level. Consult the SDS or EHS for this information.

CHANGE CARTRIDGES/FILTERS as required. (**IMPORTANT** – In addition to following cartridge change schedules, change cartridges/filters if you experience an increased resistance in breathing or when you detect contaminant odors or taste while wearing your respirator).

MASK TO FACE SEAL must be unobstructed by facial hair. You must be clean-shaven to obtain an effective seal.

If you use safety equipment that may interfere with the sealing of your respirator, you need to be fit tested with the PPE that you use.

This respirator has been assigned to you only - **DO NOT LOAN** it to anyone else.

QUANTITATIVE FIT TESTING must be repeated immediately when any of the following has taken place:

- a) Weight change of 20 lbs. or more
- b) Facial scarring in the area of the face-piece seal
- c) Significant dental changes (Multiple extractions without prosthesis, or acquiring dentures)
- d) Reconstructive or cosmetic surgery
- e) Any other condition that may interfere with the facepiece seal

Employee Signature: _____ Date: _____

APPENDIX D: RESPIRATOR FIT CHECKS

Each time a respirator is donned, the user performs positive and negative fit checks. Fit checks are not a substitute for fit testing performed by Caltech's EHS Office.

NEGATIVE PRESSURE CHECK

This test cannot be performed on all respirators. It can be performed on the facepieces of air-purifying respirators with tight-fitting inlet covers. It can also be performed on SCBA respirators equipped with breathing tubes that can be squeezed at the inlet to prevent passage of air.

To perform the negative pressure check:

- 1 Close the inlet opening. This is addressed by covering the canister, cartridge, or filter with the palm of the hand or squeezing the inlet tube.
- 2 Inhale gently and hold for at least 10 seconds.

The facepiece should collapse slightly with no detectable inward leakage of air into the facepiece. It can be reasonably assumed that the respirator is properly positioned and the exhalation valve and facepiece are not leaking.

POSITIVE PRESSURE CHECK

This test cannot be performed on all respirators. Respirators with exhalation valves can be tested. To perform the positive pressure check:

- 1 Close the exhalation valve or breathing tube with the palm of the hand; and
- 2 Exhale gently.

A properly positioned facepiece will build up a slight positive pressure. There should be no detection of outward leakage between the sealing surface of the facepiece and the face.

APPENDIX E : 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. 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 respirators are for voluntary use, or if an employee provides his/her own respirator, he/she needs to take certain precautions to be sure that the respirator itself does not present a hazard.

Respirator wearer should:

- 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;
- 3 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 wearer what the respirator is designed for and how much it will protect him/her;
- 4 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; and
- 5 Keep track of your respirator so that you do not mistakenly use someone else's respirator.

APPENDIX F: RESPIRATOR FIT TESTING GUIDELINES

A “fit test” tests the seal between the respirator’s facepiece and your face. It takes about fifteen to twenty minutes to complete and is performed at least annually. After passing a fit test with a respirator, you must use the exact same make, model, style, and size respirator on the job.

- 1 Respirator wearers with facial hair will need to remain clean shaven (in facial seal areas) so that a respirator can be worn. See below.
- 2 Employees need to bring any type of PPE usually worn when performing the job involving respirators. E.g. Safety glasses.
- 3 Respirator wearer may not eat, drink (except for plain water), smoke, or chew gum for 15 minutes before the test.

