

# RESPIRATORY PROTECTION PROGRAM

Massachusetts Institute of Technology  
Environment, Health & Safety Office



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## 1. INTRODUCTION

The Occupational Safety and Health Administration's (OSHA) General Industry Standard on Respiratory Protection, 29 CFR 1910.134, requires that a Respiratory Protection Program (RPP) be established by employers and that respirators be provided and be effective when such equipment is necessary to protect the health of employees.

The Institute strives to control respiratory hazards at their point of generation by using engineering controls (e.g., local or general exhaust ventilation) and good work practices. In keeping with this goal, the use of respirators as the primary means of protecting employees and students from airborne hazards is considered acceptable only in very specific situations. These situations include short term, temporary experiments or projects where engineering controls are not feasible; use of respiratory protection as an added or supplemental control; and emergency conditions.

When it has been determined by the user in conjunction with the Industrial Hygiene Program (IHP) that respiratory protection may be used, it is the responsibility of each Department to provide a standard operating procedure with respect to the use of respirators. This procedure will be part of their Chemical Hygiene Plan or Safety Plan. Such a procedure is required even if respiratory protection is not required but is being used for comfort of Departmental personnel (voluntary use). This program must follow the guidelines set forth in this document. The RPP includes the following components:

- Respirator selection (including National Institute of Occupational Safety and Health [NIOSH] approval of respirators)
- Training of Respirator Users
- Fit Testing
- Assignment of Respirators
- Cleaning and Disinfecting
- Inspection and Maintenance
- Storage
- Work Area Surveillance and Exposure Assessment
- Inspection and Evaluation of the Program
- Medical Examinations

It is intended that each mandated respirator user will be reviewed at least annually by the IHP and that volunteer users will be fitted initially and only annually at their own discretion.

## 2. RESPONSIBILITY

The designated administrator for the RPP is Nancy Doherty of the IHP. She is responsible for oversight and evaluation of the Program. She may delegate responsibility for various aspects of the Program to other qualified MIT personnel as appropriate. The IHP is located in N52-496 and can be contacted at x2-3477.

Principal investigators and Facilities supervisors are responsible for ensuring that students and personnel under their supervision seek respiratory protection when it is appropriate. Responsibility for overseeing the implementation of the RPP for individuals requiring protection rests with the immediate supervisor or principal investigator. The IHP will provide technical support.

Before anyone (volunteer or mandated user) at the Institute can wear a respirator the conditions listed below must be met:

1. Written medical approval must be obtained from the Medical Department. An appointment for a medical exam can be made by contacting the Medical Department (3-8552).
2. An exposure assessment must be conducted by IHP or an IHP designate (i.e., Safety Office within Draper Labs and Lincoln Labs) for the individual planning to use the respirator. The individual planning to use the respirator is required to complete an "Exposure Evaluation Questionnaire" – this questionnaire will provide IHP/IHP designate with the information required to perform an exposure assessment.
3. IHP or an IHP designate must train the user in the proper use and care of the respirator.
4. IHP or an IHP designate will conduct a qualitative and/or quantitative fit test for the user while he/she is wearing the chosen respirator.

## 3. MEDICAL EXAMINATIONS

Federal regulations require a medical evaluation of all personnel who are required to wear respiratory protection. This evaluation must take place before fit testing and subsequent use of the respirator.

To make an appointment for this evaluation, call MIT Medical at 3-8552 and request a "respirator user examination". The examining physician or licensed health care professional will issue a qualification statement (Appendix A) to the IHP which will allow a

respirator fit test to proceed, or will state that the user is not qualified to wear a respirator or is restricted to specific types of respirators or conditions of use.

The use of any type of respirator may impose some degree of physiological stress on the user. The degree of stress will be a function of the following factors:

- Type of respirator to be used
- Tasks to be performed while wearing the respirator
- The energy requirements of the tasks
- Visual and auditory requirements of the tasks
- Length of time the respirator must be worn
- The nature of the hazard prompting the need for respiratory protection
- Thermal environment in which the respirator will be worn

Consequently, it is necessary to determine that all persons required and volunteering to wear a respirator are physically able to perform the work and use the required equipment. This determination is made by the Medical Department at entry into the program. Information relating to the issues specified above is provided by the users to the Medical Department via the initial Medical Questionnaire. Furthermore, as part of this program, the documentation necessary to demonstrate that all respirator users have been approved by Medical is kept by IHP (N52-496) and in Medical department records.

Any respirator user shall have an additional medical evaluation if any of the following conditions are found to warrant such attention:

- The initial medical evaluation for a respirator user demonstrates the need for further medical examination
- The respirator user reports signs or symptoms that are related to one's ability to wear a respirator
- The Medical Department, RPP Administrator, or the employee's supervisor determine that re-evaluation is necessary
- Information from the periodic evaluation of the MIT RPP indicates a need for user re-evaluation
- A change in work environment conditions (physical exertion, clothing requirements, temperature or relative humidity) may substantially increase the physiological burden placed on the respirator user

#### 4. WORK AREA SURVEILLANCE & EXPOSURE ASSESSMENT

To comply with the OSHA Respiratory Protection standard (29 CFR 1910.134 and 1910.1450), IHP must conduct an exposure assessment for each respirator user. This information will be used by IHP to confirm that respiratory protection is an appropriate exposure control for the activity and will guide in the selection of an appropriate respirator for each user. The evaluation includes a review of the process for which the respirator will be used, the chemicals that are used during this process, the conditions of use, the amount(s) of chemical(s) used, the duration of chemical use, the availability of engineering controls, and any past exposure monitoring data. Additional exposure monitoring and/or a site visit may be warranted.

Documentation of this work area evaluation and exposure assessment will be compiled by IHP on the form in Appendix G, or other suitable format (e.g. memorandum). This documentation will be retained by IHP at N52-496.

#### 5. RESPIRATOR SELECTION

Once the potential airborne hazards have been evaluated and it has been determined that there exists a potential for exposure to airborne contamination in concentrations that exceed available OSHA Permissible Exposure Levels (PELs), or whenever there is a realistic respiratory allergy hazard, then a respirator should be selected. Decision logic is used to select the appropriate respirator and the following factors are taken into account:

- Physical state of the contaminants
- Toxicity of the contaminants
- Warning properties of contaminants
- Potential for oxygen deficiency
- Potential concentrations (immediately dangerous to life and health)
- Available occupational exposure limits (OSHA PEL, ACGIH TLV, etc.)
- Expected respirator protection factor
- NIOSH respirator approval

It should be noted that whenever a process change occurs which may affect the airborne concentration of the contaminant(s), the choice of respirator should be reviewed. Respirators and replacement parts are available from IHP in sizes necessary to fit the user population. The procedure for obtaining a respirator at MIT is further described in Appendix B.

#### 6. TRAINING OF RESPIRATOR USERS

Training related to the general use of respiratory protective equipment is performed by IHP. Each specific department is responsible for providing specific details of any unique aspects of respirator use within the department. Training is conducted before anyone uses a

respiratory protective device and at least annually thereafter for non-voluntary (mandated) use.

### General Training

All individuals who wear a respirator must be trained in the proper use and care of their respirator by qualified instructors – typically IHP staff will conduct the training. This training includes discussion and/or demonstration of the elements of respirator use and care (provided in Appendix C) and/or viewing of an instructional video provided by the respirator manufacturer.

### Specific Training

In addition to the general training discussed above, respirator users must receive training in the health hazards associated with the specific chemicals to be handled and the rationale for use of respiratory protection. This includes specific information on how and why the respirator was selected, a discussion of its limitations, and the consequences of improper use of the respirator. This training is provided by the appropriate departmental person (e.g., laboratory supervisor, safety coordinator, senior technician, etc.) with support/assistance from IHP and the Medical Department.

## 7. FIT TESTING

In order to receive the desired protection from a tight fitting respirator, it is essential that it fits properly. Therefore, all personnel required to wear respirators (including SCBA and air line units) must undergo fit testing. There are two basic steps in determining the fit of a respirator:

- A. Quantitative fit testing in a test atmosphere is performed to determine which particular size of a given respirator model provides the best fit for an individual user. This testing is done when the respirator is first issued by IHP prior to its initial use, repeated at least annually, and whenever a user has a facial change that may affect the fit of his respirator (e.g. growth or shaving of facial hair, significant gain or loss of weight, plastic surgery, or change in dentures). This testing is done by the IHP and the records are kept at N52-496. Appendix D describes the fit testing procedure.
- B. The OSHA regulations (29 CFR 1910.134, Appendix B1) require that a respirator be tested qualitatively for fit **EVERY TIME IT IS WORN** via a user seal check. This requirement is usually met by the user performing a positive and negative pressure seal test each time the respirator is put on. Instructions on how to perform this user seal check must be included as part of the formal training of respirator users and are provided below:
  1. Positive Pressure Check: Cover the exhalation valve with your palm and exhale gently (you may need to remove the exhalation valve completely to

perform the check – remember to replace it when you're done). While covering the valve, try not to press so hard that the fit of the facepiece changes on your face. You should see & feel the facepiece bulge slightly. Hold your breath for about 10 seconds, keeping the facepiece slightly pressurized. If pressure is maintained in the facepiece without leakage, you've achieved a satisfactory fit

2. Negative Pressure Check: Gently place your palms over the cartridges/filters. Try not to press so hard that the fit of the facepiece changes on your face. If you can't completely cover the cartridges/filters with your palms, you can perform the test by covering the cartridge/filter with a thin nitrile or latex glove. Inhale gently so that you feel/see the facepiece collapse slightly. Hold your breath for about 10 seconds while the facepiece is collapsed. If the facepiece remains collapsed without leakage, you've achieved a satisfactory fit.
3. For some types of disposable dust masks, a specifically constructed device is required in order to perform the above tests.

Individuals with facial hair that interferes with the respirator face seal (e.g. beard, moustache, sideburns) shall be allowed to wear only an air-supplied respirator or a powered air-purifying respirator with a hood, depending on the anticipated exposure. An individual with facial hair will not be allowed to wear a respirator that requires a facial seal.

## 8. ASSIGNMENT OF RESPIRATORS

Respirators are assigned to individuals for their exclusive use. This policy should be adhered to for all routine respirator users at the Institute. For emergency and some other designated non-routine uses, shared respirators may be used, but they must be made available in all sizes necessary to accommodate the user population.

Each respirator permanently assigned to an individual should be durably marked to indicate to whom it was assigned. This mark should be made so as not to affect the respirator performance in any way.

The date of respirator assignment is recorded for both individuals and general-use respirators. These records are kept by the IHP (N52-496).

## 9. RESPIRATOR CLEANING & DISINFECTING PROCEDURES

The following procedures describe good general techniques for cleaning respirators. Alternative procedures, such as recommendations provided by the respirator manufacturer, may be used as long as the method is equally effective to those described below. These procedures are intended to facilitate proper cleaning and disinfecting of respirators in a manner that prevents damage to the respirator and does not cause harm to the user.

## A. CLEANING & DISINFECTING

- Individually assigned reusable respirators shall be cleaned and disinfected by the user at the end of each day on which they are used or more frequently if necessary.
- Respirators that may be used by more than one person, such as emergency use respirators, shall be cleaned and disinfected after each use by the last user.
- Remove the cartridges or canisters and set aside. Then disassemble the facepiece by removing the speaking diaphragm, demand and pressure demand assemblies, hoses, or any other components recommended by the manufacturer.
- Wash the facepiece and components in warm (110°F) water containing a mild detergent or other cleaners recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
- If the cleaner selected does not contain a disinfectant, then each of the respirator components should also be immersed for at least two minutes in one of the following:
  - hypochlorite solution (1 milliliter of household bleach added to 1 liter of warm water (110°F));
  - iodine solution (0.8 milliliters of tincture of iodine added to 1 liter of warm water (110°F));
  - other commercially available disinfectants if their use is recommended or approved by the respirator manufacturer.

## B. RINSING

- Rinse the cleaned and disinfected respirator components thoroughly in clean, warm (110°F) and preferably running water. Drain.
- NOTE: Detergents or disinfectants that dry on the facepiece may cause dermatitis (skin irritation) for the user. The rinsing process is intended to completely remove residue from the surface of the respirator components.

## C. DRYING

- The respirator components may be dried by hand with a clean lint-free cloth.
- Alternatively, the components may be allowed to air dry by laying them on clean surface.
- Do NOT hang the respirator up by the straps - this can cause warping of the facepiece.

After the respirator components have dried, reassemble the facepiece with cartridges, (if necessary, replace old cartridges). Test the respirator to ensure that all components work properly.

Assistance with this procedure and information related to the purchase of respirator cleaning supplies may be obtained from IHP.

## 10. INSPECTION AND MAINTENANCE OF RESPIRATORS

The formal Respirator Training program shall include instruction on the inspection of the respirator before each use and during cleaning. All non-emergency respiratory equipment shall be inspected by the user during cleaning and immediately before and after each use. Respiratory equipment designated for emergency use shall be thoroughly inspected before and after each use, during cleaning, but not less frequently than once a month.

NOTE: Records of inspection dates and findings for respirators maintained for emergency use are the responsibility of the department that owns them. IHP will assist with these inspections at the department's request.

The following is a list of items to look for when inspecting various types of respirators and corresponding corrective actions in parentheses:

### A. Air Purifying respirators (half-mask, full facepiece, and gas mask)

#### 1. Rubber facepiece - check for:

- Excessive dirt (clean & sanitize)
- Cracks, tears or holes (obtain new facepiece)
- Distortion (allow facepiece to sit free from any constraints and see if distortion disappears within 30 minutes. If not, obtain new facepiece)
- Cracked, scratched or loose-fitting lenses (replace lens if possible. If not, obtain new facepiece)

#### 2. Headstraps - check for:

- Breaks or tears (replace headstraps)
- Loss of elasticity (replace headstraps)
- Broken or malfunctioning buckles or attachments (obtain new buckles or replace headstraps)
- Excessively worn serrations on the head harness which might allow the facepiece to slip (replace headstrap)
- Check the tightness of all strap connections (tighten or replace if necessary)

3. Inhalation valve and exhalation valve - check for:
  - Detergent residue, dust particles, or dirt on valve/valve seat (remove residue with soap and water)
  - Cracks, tears or distortion in the valve material or valve seat. (replace valve material if possible, contact manufacturer for instructions)
  - Missing or defective valve cover (obtain new valve cover)
4. Cartridge elements - check for:
  - Proper cartridge for the hazard
  - NIOSH approval
  - Missing or worn gaskets (replace with new parts)
  - Worn threads - both cartridge thread and facepiece threads (replace cartridge or facepiece)
  - Cracks or dents in cartridge housing (replace cartridge)
  - Deterioration of gas mask canister harness (replace harness)
  - Check the tightness of the connection (tighten if necessary)
5. Gas mask corrugated breathing tube - check for:
  - Cracks or holes (replace tube)
  - Missing or loose hose clamps (obtain new clamps)
  - Broken or missing end connectors (obtain new connectors)
  - Check the tightness of the connections

B. Atmosphere Supplying Respirators (SCBA, airline)

1. Check facepiece, headstrap, valves and breathing tubes as for air-purifying respirators.
2. Faceshield, hood, helmet, full suit - check for:

- Cracks or breaks in faceshield (replace faceshield)
  - Rips and torn seams (if unable to repair, replace)
3. Air supply system
- Breathing air quality
  - Breaks or kinks in air supply hoses and end fitting attachments (replace hose and/or fitting)
  - Tightness of connections (tighten if necessary)
  - Proper setting of valves and regulators (consult manufacturer's recommendations)
  - Correct operation of air-purifying elements
4. Self contained breathing apparatus
- Consult manufacturer's literature for inspection protocol.

## 11. STORAGE

- After cleaning and disinfecting, each respirator should be placed in its storage box or bag. If not individually assigned, store each respirator in a heat-sealed or resealable plastic bag. The in-bag storage is critical to prevent premature failure of air purifying cartridges.
- Respirators shall be stored in a convenient, clean and sanitary location, positioned so as to minimize any deformation of the facepiece and exhalation valve.
- Care shall be taken to protect them from dust, sunlight, extremes of temperature, moisture and chemicals.
- Respirators in bulk storage shall be placed in a single layer, in such a way that all components (e.g. facepiece, valves, breathing tubes) will rest in a normal position. Storage in an abnormal position may cause deformation of the unit which will impair the fit and functioning of the respirator.
- Respirators intended for emergency use shall be stored at a location accessible to the work area, and in a compartment or cover that is clearly marked as

containing emergency respirators.

## 12. RESPIRATOR USE UNDER SPECIAL CONDITIONS (IHP should be consulted for advice)

### A. Dangerous Atmospheres ("IDLH")

If respiratory protective equipment usage is anticipated in atmospheres "immediately dangerous to life or health" (IDLH), special preparations must be made. A standard operating procedure for work in high hazard areas must be written.

The standard operating procedure must cover at least the following:

- Individuals designated to enter into dangerous atmospheres must have training with the proper equipment, i.e., self-contained breathing apparatus (SCBA).
- Designation and provision of at least one standby individual who is equipped with proper rescue equipment and must be constantly present in a nearby safe area for possible emergency rescue. Written procedures should address the rescue procedure, including notification of other appropriate MIT personnel.
- Provision for communication between persons in the dangerous atmosphere and the standby person(s) must be made. Communication may be visual or by voice, signal line, telephone, radio, or other suitable means. Other important data such as toxicological information and emergency telephone number should also be included.
- Pertinent locations at MIT include Buildings 13, 38, and 39, the Nuclear Reactor Lab (bldg. NW12), the Alcatraz C-MOD Cell in Building NW21, Draper Laboratory and Lincoln Laboratory.

### B. Confined Spaces

Confined spaces are defined as spaces that are large enough and so configured that an employee can bodily enter and perform work, that have limited or restricted means for entry or exit, and that are not designed for continuous occupancy. In many cases, confined spaces contain toxic air contaminants, are deficient in oxygen, or both. As a result, special precautions must be taken.

When choosing the appropriate respirator for work in a confined space, the following factors should be considered:

- Airline supplied air respirators may be worn in a confined space only if the tests show that the atmosphere contains adequate oxygen and that air contaminants

are well below levels immediately dangerous to life or health. While individuals wearing these types of respirators are in a confined space, the atmosphere must be monitored continuously.

- If the atmosphere in a confined space is immediately dangerous to life or health due to a high concentration of air contaminants or oxygen deficiency, those entering the space must wear a positive pressure SCBA or a combination airline and a positive pressure self-contained breathing respirator.
- Compliance with the OSHA Confined Space Standard (29CFR 1910.146) is the responsibility of each department. Assistance is available from the Safety Program and the IHP of the EHS Office.

### C. Low and High Temperature Environments

Use of respiratory protective equipment in low temperatures can create several problems. The lenses of the full facepiece equipment may fog due to condensation of the water vapor in exhaled breath. Coating the inner surface of the lens with an anti-fogging compound will reduce fogging. Nose cups that direct the warm, moist exhaled air through the exhalation valve without passing over the lens are available from the manufacturer for insertion into the full facepiece. At low temperatures, the exhalation valve can freeze onto the valve seat due to the moisture in the exhaled air. The user will be aware when this situation occurs by the increased pressure in the facepiece. When unsticking the valve, be careful so as not to tear the rubber diaphragm.

Respirator usage in hot environments can put additional stress on the user. The stress can be minimized by using a light-weight respirator with low breathing resistance. In this respect, an airline type atmosphere-supplying respirator equipped with a vortex tube can be used. Since the vortex tube may either cool or warm the supplied air (depending on the connection and setting), this protection scheme can be used in both hot and cold environments.

Examples of such work environments at MIT are the manholes, areas of the Central Utilities Plant, and seasonal outdoor work.

## 13. ONGOING EVALUATION OF THE RESPIRATOR PROGRAM

Numerous factors affect an employee's overall comfort level with respirators and the MIT RPP. These factors include comfort, ability to breathe without objectionable effort, adequate visibility under all conditions, provisions for wearing prescription glasses (if necessary), ability to communicate, ability to perform all tasks without undue interference, and confidence in the facepiece fit.

For an RPP to be effective, it is important that all these factors be considered as the program is developed. Furthermore, it is essential that the respirator users be involved in the process of developing the procedures for respirator use. To this end, the Industrial Hygiene Program actively involves the users both by observing respirator use and by soliciting user comments with respect to resolution of problems associated with respirator use. This cooperation is vital to the ultimate success of any Respirator program, and the user involvement is documented as part of the program.

A respirator user audit checklist (Appendix E) is employed for workplace evaluation of a portion of affected MIT employees each year. Factors to be evaluated include fit, appropriateness of selection, maintenance, and storage.

APPENDIX A  
Respirator User Qualification Statement

RESPIRATOR USER QUALIFICATION STATEMENT

TO: Industrial Hygiene Program, N52-496  
FROM: MIT Medical Department  
RE: Employee Name: \_\_\_\_\_  
ID#: \_\_\_\_\_  
DATE: \_\_\_\_\_

The employee/student listed above has completed a Respirator User Medical Clearance Exam

The employee/student is approved for all respirator use, including SCBA, without restriction

The employee/student is approved for respirator use with the following restriction(s):

\_\_\_\_\_  
\_\_\_\_\_

Respirator is not approved

The employee/student should return for a review of medical fitness in:

1 year       2 years       5 years

Comments: \_\_\_\_\_

\_\_\_\_\_  
Medical Department Staff

NP/MD

**APPENDIX B**  
**Fact Sheet for Respirator Users**

# FACT SHEET

## For Users of Respiratory Protective Equipment

MIT-affiliated staff, researchers, and other employees who are required or wish to use respiratory protective equipment while at work must participate in the MIT Respiratory Protection Program (RPP). The Industrial Hygiene Program (IHP) within MIT's Environment, Health & Safety Office, located in N52-496, manages the RPP according to the requirements of the United States Occupational Safety and Health Administration (OSHA).



Before you decide to use respiratory protection, get in touch with a member of the IHP (x2-3477 or [respirators@mit.edu](mailto:respirators@mit.edu)) to discuss your options. Often other, simple solutions can be implemented to reduce any anticipated exposure to vapors, dusts, or other airborne contaminants. These other solutions are often effective in preventing exposure so that respiratory protection is not required.

Individuals must satisfy several requirements before IHP will issue him/her a respirator. These requirements are outlined below and must be met in the order listed:

- **Receive a medical evaluation from MIT Medical:** To schedule the evaluation, call x3-8552 and request a "respirator user exam". The medical evaluation consists of completing a questionnaire, a brief physical examination, and a lung function test (if necessary). MIT Medical will complete an approval form for the user that will be delivered to the IHP Office in N52-496.
- **Complete the Exposure Evaluation Questionnaire:** During your appointment at MIT Medical, you will be given an Exposure Evaluation Questionnaire that you must complete and deliver to IHP in N52-496 (you can deliver it at the time of your "fit test" – see number 3 below). Your answers to this questionnaire will help IHP staff determine what type of respiratory protection you require. In some cases, IHP may conduct air sampling to better understand the exposure.
- **Schedule a Respirator Fit Test:** Before you can wear a respirator, a test must be conducted to determine if the respirator fits you adequately. This test is called a "fit test" and takes approximately 30 minutes to complete. During the test, an IHP staff member will train you in how to use and take care of your respirator. Additionally, you will put on your respirator and a series of tests will be performed to determine if it fits you well. To schedule a fit test, call IHP at x2-3477 or email at [respirators@mit.edu](mailto:respirators@mit.edu). If you want or need your own respirator, you must bring a requisition from your department with you. (Please note, fit tests must be conducted annually for as long as you use your respirator – IHP will contact you when it's time for you to have another fit test)



Please keep in mind that once a respirator has been issued to you, it is for your use *only*. Others are not permitted to use your respirator for any reason or condition. If another individual wants to use a respirator, inform them of the RPP requirements.

Should you require replacement parts or new filters/cartridges for your respirator, call IHP.

When you come to IHP's office for your annual fit test, you will be asked to fill out a short questionnaire. Your responses to this questionnaire will inform IHP of your current need for respiratory protection and the current conditions under which you use your respirator. If you do not complete this questionnaire, you will be removed from the list of approved respirator users. When you no longer need your respirator or if you leave the Institute, contact IHP.



A complete written summary of MIT's RPP is available at <http://web.mit.edu/environment/ehs/respiratory.html>.

APPENDIX C  
Respirator User Training Outline (Initial)

## RESPIRATOR TRAINING OUTLINE

### 1. BACKGROUND INFORMATION

Respirator used to protect from air contaminants

Use when engineering controls not feasible or inadequate alone, or during their installation

Use when airborne concentration is known to exceed PEL or where degree of exposure is unknown and suspect problem may exist but has not yet been evaluated by air sampling

### 2. REASON FOR TRAINING

To get the expected protection must know how to use respirator properly

To use properly must understand:

How to wear, maintain, etc.

Proper application, i.e., appropriate cartridge, etc. and its limitations

### 3. CHOICE OF RESPIRATOR

#### A. Air Purifying

Choosing proper cartridge for hazard

Cartridges are color coded to match specific hazard

Cartridges must match !

Do not interchange cartridges from different manufacturers

Concentration limitation

Toxicity limitation for dust, mist, fumes

Must have adequate O<sub>2</sub> (19.5%)

Negative pressure respirators have potential for leakage

If gas or vapor, the contaminant must have adequate warning properties, i.e., detectable by smell, taste or irritation at non-hazardous concentration.

#### B. Supplied Air or Self-Contained Breathing Apparatus or Powered Air Purifying Respirator

Use of cartridge inappropriate:

O<sub>2</sub> too low (<19.5%)

Inadequate warning properties

Concentration of toxic material too high (IDLH)

No cartridge applicable

Only use NIOSH-approved equipment

#### 4. RESPIRATOR FIT

How to put on (Demonstration)

Fit Testing

Qualitative

- positive or negative pressure test
- required every time put on - OSHA REGULATION
- isoamyl acetate-subjective

Quantitative

- annual; after significant change in facial characteristics
- hair
- weight change
- dental
- plastic surgery
- problem with fit
- facial hair
- facial shape-try different sizes
- Corrective lenses with full facepiece

If detect contaminant with respirator - 2 possible reasons:

1. Bad fit: re-adjust mask
2. Cartridges need changing: see maintenance

#### 5. INSPECTION AND MAINTENANCE

Each time put on check:

- Valves
- Straps
- Facepiece

- Cover for exhalation valve
- When to change cartridge/filter

When detect chemical odor inside mask or for dust respirators, resistance too great

Administrative i.e. daily/weekly - frequency based on conditions of use

- Cleaning
- Responsibility of individual
- Do not use solvents > degrade rubber of facepiece

## 6. STORAGE

- Clean, dry location away from contaminants, preferably in sealed plastic bag
- In natural position, not distorted

## 7. WEAR IT!

APPENDIX D  
Respirator Fit Test Protocol

## FIT TESTING PROTOCOL

Quantitative fit testing is performed for users of air-purifying and SCBA respirators using the TSI Portacount. The following protocol is followed.

- 1) The user is instructed in the use and donning of the respirator (either 1/2 facepiece or full facepiece)
- 2) Once donned, the user is instructed to perform a user seal check.
- 3) Once there is an acceptable fit, three quantitative tests are performed.
  - 1) Normal breathing (60 s)
  - 2) Deep breathing (60 s)
  - 3) Head Up and Down (60 s)
  - 4) Head Side to Side (60 s)
  - 5) Talking (60 s)
  - 6) Bending (60 s)
  - 7) Normal breathing (60 s)

Acceptance: The fit is considered acceptable if the following fit factors are obtained  
half facepiece - >100  
full facepiece - >500  
SCBA - >500

NOTE: If the respirator is to be used for a specific chemical with an OSHA defined quantitative fit test protocol (e.g. asbestos, formaldehyde) then that protocol will be followed

APPENDIX E  
Departmental Respirator Use Audit

## RESPIRATOR PROGRAM AUDIT

In general, the Respirator Program should be evaluated at least annually, with program adjustments, as appropriate, made to reflect the evaluation results. Program function can be separated into administration and operation.

### 1. PROGRAM ADMINISTRATION

- A. Is responsibility for overseeing program vested in one individual who is knowledgeable and who can coordinate all aspects of the program?
- B. What is the present status of the implementation of engineering controls, if feasible, to alleviate the need for respirators? (Complete, In-Progress, Needs Evaluation)
- C. Are there written procedures/statements covering the various aspects of the Respirator program?
  - Designation of administrator;
  - Respirator selection;
  - Purchase of approved equipment;
  - Issuance of equipment;
  - Fitting;
  - Maintenance, storage, repair;
  - Inspection;
  - Use under special condition.

### 2. PROGRAM OPERATION

- A. Respiratory protective equipment selection
  - o Are work area conditions and employee exposures properly surveyed?
  - o Are respirators selected on the basis of hazards to which the employee is exposed?
  - o Are selections made by the individuals knowledgeable to selection procedures?
- B. Are only approved respirators purchased and used and do they provide adequate protection for the specific hazard and concentration of the contaminant?
- C. Has a medical evaluation of the prospective user been made to determine their physical and psychological ability to wear respiratory protective equipment?
- D. Where practical, have respirators been issued to the users for their exclusive use, and are there records covering issuance?

E. Respiratory protective equipment fitting

- o Are the users given the opportunity to try on several respirators to determine whether the respirator they will subsequently be wearing is the best fitting one?
- o Is the fit tested at appropriate intervals?
- o Are those users who require corrective lenses properly fitted?
- o Is the facepiece to face seal tested in a test atmosphere?

F. Maintenance of respiratory protective equipment

Cleaning and Disinfecting

- o Are respirators cleaned and disinfected after each use when different people use the same device, or as frequently as necessary for devices issued to individual users?
- o Are proper methods of cleaning and disinfecting utilized?

Storage

- o Are respirators stored in a manner so as to protect them from dust, sunlight, heat excessive cold or moisture, or damaging chemicals?
- o Are respirators stored properly in a storage facility so as to prevent them from deforming?
- o Is storage in lockers and tool boxes permitted only if the respirator is in a carrying case or carton?

Inspection

- o Are respirators inspected before and after each use and during cleaning?
- o Are qualified individuals/users instructed in inspection techniques?
- o Is respiratory protective equipment designated as "emergency use" inspected at least monthly (in addition to after each use)?
- o Is a record kept of the inspection of "emergency use" respiratory protective equipment?

Repair

- o Are replacement parts used in repair those of the manufacturer of the respirator?
- o Are repairs made by knowledgeable individuals?
- o Are repairs of SCBA made only by certified personnel or by a manufacturer's representative?

Training

- o Are users trained in proper respirator usage?
- o Are users trained in the basis for selection of respirators?

APPENDIX F  
Mandatory Information for Voluntary Respirator Users

## **Mandatory Information for Voluntary Respirator Users**

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.
3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.
4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

APPENDIX G  
Information for Reasonable Estimates of Employee Exposure



## MIT Environment, Health, & Safety Office

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### Evaluation of Respiratory Exposure Hazards Form

Your Name: \_\_\_\_\_

Date: \_\_\_\_\_

Telephone Extension & Email: \_\_\_\_\_

Bldg./Room: \_\_\_\_\_

**Supervisor/Principal Investigator (PI) (may complete this form, if appropriate):**

\_\_\_\_\_

**Who completed this form?**  You  Supervisor/PI

*The purpose of this evaluation is to characterize the respiratory hazards presented by the specific use or handling of hazardous chemicals and materials.*

*OSHA and other agencies and organizations have published criteria which MIT uses to establish requirements relative to the use of respiratory protective equipment.*

*In order to initially evaluate the respiratory exposure hazards, EHS needs the following information:*

1. What are the potentially hazardous chemical(s) or substance(s) which have prompted the request for respiratory protection or an evaluation?

2. Describe in detail the processes or operations in which the chemical or material is or will be used. Include information about the chemical and physical state(s) of substances used, the amount of each chemical used, and the physical conditions under which the chemicals are used (e.g., temperature, pressure).

3. How often is the process performed?

4. Describe any other factors which you think may increase hazards from working with the chemical or material such as grinding, machining, evaporation, etc.

5. Describe the work environment and working conditions:

5.1. Approximate dimensions of the work area:

5.2. Any general or local exhaust in the area (if so, describe):

5.3. Is the work space in an unusual configuration?

5.4. Are any other staff or students involved in or in close proximity to the process?

5.5. Any other conditions that you consider important:

6. Describe the level of work activity and any possible physical stresses on the respirator user. What other personal protective equipment (PPE) may be required?

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*You are done with your portion of this questionnaire. The EHS Office will complete the rest at the time of your Fit Test. You MUST bring this form with your portion completed to the EHS Office when you have your fit test. If you don't have this form completed at the time of your fit test, the EHS Office will ask you to reschedule your fit test when you've completed your portion.*

**STOP! This portion of the questionnaire is for EHS Office use only.**

**IHP Representative Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

7. Describe reasonably foreseeable emergency situations, given the description of chemical use in the process. Would this type of situation likely require a greater degree of respiratory protection?

8. Has personal exposure monitoring or area sampling been conducted by IHP to characterize this exposure? (check the air sampling cross-reference file) Describe the outcome of the monitoring.

9. Has personal exposure monitoring or area sampling been conducted by IHP during similar operations at other MIT locations? (check the air sampling cross-reference file)

10. Can real-time monitoring be conducted during the process/operation to provide an estimate of exposure risk?

11. Recommendation for RPE, including cartridge specification, end of life indication, facepiece specification, and warning properties.