

Respiratory Protection Program

Guideline

Revision Date: 10/12/21

Applies To: All University employees that utilize respiratory protection. Michigan Medicine/Hospital employees are also covered by this Guideline except for the use of N95 dust mask respirators for protection against infectious diseases. This type of respirator use is covered under Michigan Medicine's Respiratory Protection Program.

Table of Contents

Summary	2
Scope	2
Reference Regulations	3
Glossary of Terms	3
Responsibility	5
EHS	5
Program Administrator	5
Supervisors.....	6
Employees.....	6
Procedures-General	6
Hazard Determination and Equipment Selection	6
Hazard Determination	6
Equipment Selection.....	7
Employment Status and Medical Clearance	7
Employment Status.....	7
Medical Surveillance	8
<i>Initial Medical Evaluation</i>	8
<i>Additional Medical Evaluations</i>	8
<i>Medical Surveillance for Voluntary Respirator Use</i>	9
Fit Testing and Fit Checking	9
Fit Checking.....	10
<i>Negative Pressure Seal Check</i>	10
<i>Positive Pressure Seal Check</i>	10
Fit Testing.....	10
<i>Quantitative Fit Test</i>	10
<i>Qualitative Fit Test</i>	10
Maintenance, Care, and Use of Respiratory Equipment	11
Use of Respirators.....	11

Cartridge Change Schedule.....	11
Assurance of Appropriate Air Quality for Air Supplying Respirators	12
Annual Training on Respirator Use	12
Program Evaluation.....	13
Recordkeeping.....	13
Related Documents.....	14
Technical Support	14

Summary

The Respiratory Protection Guideline provides the University community with the necessary information to understand respiratory protection requirements and the means to obtain proper respiratory protection from EHS. The reliability of any *respirator* is dependent on proper selection, training, medical screening, and respirator maintenance. Therefore, University employees **must** obtain all respiratory protection devices through EHS. However, filtering facepieces, i.e., dust masks, KN95 and N95s etc., used voluntarily can be obtained through EHS, other U-M departments, or purchased through [M-Marketsite](#) or other suppliers provided that the [Information for Voluntary Users of Respirators \(1910.134 Appendix D\)](#) is provided to the employee.

Scope

This Guideline applies to all University employees that utilize respiratory protection. Michigan Medicine/Hospital employees are also covered by this Guideline except for the use of filtering facepiece N95 respirators for protection against infectious diseases. This type of respirator use is covered under Michigan Medicine's Respiratory Protection Program.

The University's [Scientific Diving Program](#) covers the use of Self-Contained Underwater Breathing Apparatus (SCUBA).

Employee protection from occupational diseases caused by breathing air contaminated with harmful dusts, fumes, sprays, mists, fogs, smokes, vapors, gases, or radioactive material is best achieved by prevention of atmospheric contamination through the use of engineering control measures, e.g., enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials.

MIOSHA regulations specify that compliance with the Permissible Exposure Limits (PELs) of potentially hazardous substances MAY NOT be accomplished through the use of respirators alone except:

- During the period necessary to install engineering controls;
- In situations where engineering controls are either not feasible or are insufficient to reduce the airborne concentration of a potentially hazardous substance below the specified PEL; and
- In emergency situations.

Approved respirators must be made available and used only when it is not possible or practical to use or maintain engineering controls.

Reference Regulations

[Respiratory Protection Standard](#) (MIOSHA Part 451)

Glossary of Terms

TERM	DEFINITIONS
Assigned Protection Factor (APF)	Means the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program as specified by the regulations.
Air-Purifying Respirator (APR)	Respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.
Atmosphere-Supplying Respirator	A respirator that supplies the user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.
Authorized Users of SCBA	Persons who have been medically certified to wear SCBA units and have received training in the use and maintenance of SCBA equipment as per this Guideline.
Breakthrough	The penetration of challenge material(s) through a gas or a vapor air-purifying element. The quantity or extent of breakthrough during service life testing is often referred to as the percentage of the input concentration.
Canister or Cartridge	A container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.
CBRN	Chemical, biological, radiological, and nuclear agents that NIOSH has certified some respirators for protection from.
Dust Mask	A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium, e.g., a disposable particulate respirator rated as N95 (≥ 95% efficient to remove particles > 0.3 micrometers (µm) in diameter).
End-of-Service-Life Indicator (ESLI)	A system that warns the respirator user of the approach of the end of adequate respiratory protection; for example, that the sorbent is approaching saturation or is no longer effective.
Filtering Facepiece	A negative pressure particulate respirator with a filter as the integral part of the facepiece or entirely composing the facepiece that is commonly known as a “dust mask” (see definition above). Filtering facepieces are available through EHS or purchased through M-Marketsite . N95 respirators are filtering facepiece respirators.
Fit Test	Means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also Qualitative fit test-QLFT and Quantitative fit test-QNFT .)

TERM	DEFINITIONS
High Efficiency Particulate Air (HEPA) Filters	Filters capable of trapping and retaining $\geq 99.97\%$ of all particles of 0.3 micrometers (μm) in diameter. The equivalent NIOSH 42 CFR 94 particulate filters are the N100, R100, and P100 filters.
Immediately Dangerous to Life and Health (IDLH)	An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.
Maximum Use Concentration (MUC)	Means the maximum atmospheric concentration of a hazardous substance from which an employee can be expected to be protected when wearing a respirator, and is determined by the <u>assigned protection factor (APF)</u> of the respirator or class of respirators and the exposure limit of the hazardous substance. The MUC can be determined mathematically by multiplying the APF specified for a respirator by the required MIOSHA permissible exposure limit, short-term exposure limit, or ceiling limit. When no MIOSHA exposure limit is available for a hazardous substance, an employer must determine an MUC on the basis of relevant available information and informed professional judgment.
National Institute of Occupational Safety and Health (NIOSH)	A research group within the U.S. Department of Health and Human Services. NIOSH is an agency that was established to help assure safe and healthful working conditions for working men and women by providing research, information, education, and training in the field of occupational safety and health. NIOSH is the responsible organization for testing and certifying respirators.
Negative Pressure Respirator	A tight-fitting respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.
Oxygen Deficient Atmosphere	An atmosphere which contains an oxygen partial pressure of less than 148 millimeters of mercury (19.5% by volume) at sea level.
Powered Air-Purifying Respirator (PAPR)	An air-purifying respirator that uses a blower to deliver air through the air-purifying element to the wearer's breathing zone.
Pressure Demand Respirator	A respirator in which the pressure inside the facepiece in relation to the immediate environment is positive during both inhalation and exhalation.
Program Administrator	Person who is qualified by appropriate training or experience that is commensurate with the complexity of the program to administer or oversee the respiratory protection program and conduct the required evaluations of the program's effectiveness.
Physician or other Licensed Health Care Professional (PLHCP)	An individual whose legally permitted scope of practice, i.e., license, registration, or certification, allows him or her to independently provide or be delegated the responsibility to provide some or all of the health care services at the site.
Qualitative Fit Test (QLFT)	A pass/fail test to assess the adequacy of respirator fit that relies on the individual's response to a test agent.
Quantitative Fit Test (QNFT)	Means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.
Respirator	Device worn by an individual that is intended to provide respiratory protection against inhalation of airborne contaminants or oxygen deficient air. All respirators must be certified by NIOSH.

TERM	DEFINITIONS
Supplied-Air Respirator (SAR)	An atmosphere-supplying respirator in which the source of breathing air is not designed to be carried by the user.
Self-Contained Breathing Apparatus (SCBA)	An atmosphere-supplying respirator in which the source of air is contained with the respirator independent of any other source.
Service Life	The length of time required for an air-purifying element to reach a specific effluent concentration. Service life is determined by the type of substance being removed, the concentration of the substance, the ambient temperature, the specific element being tested (cartridge or canister), the flow rate resistance, and the selected breakthrough value. The service life for a self-contained breathing apparatus (SCBA) is the period of time, as determined by the NIOSH certification tests, in which adequate breathing gas is supplied.

Responsibility

EHS

- Document and administer the respirator program.
- Assess the degree of hazard associated with respiratory exposures and the need for respiratory equipment.
- Coordinate respirator purchasing, disbursement, fit testing and training.
- Provide University's medical provider with information on individual type of respirator, duration and frequency of use, physical work effort, other Personal Protective Equipment (PPE) worn and if any temperature or humidity extremes exist in work environment for the purposes of employee medical clearance and surveillance related to this program.
- Provide technical assistance upon request.
- Evaluate and recommend cartridge change-out schedules.
- Schedule and maintain records of all medical surveillance services.
- Maintain records of hazard evaluations including the maintenance of employee exposure data collected.
- Review and revise the Respirator Protection Program/Guideline including the assurance that the necessary program evaluations are performed as necessary.
- Identify a *Program Administrator*.

Program Administrator

Establish respiratory protection policies, overseeing required evaluations of program effectiveness, and for coordinating the overall respirator protection program.

The current Respirator Program Administrator is Jon Lillemoen, EHS Manager (734) 647-1142 or jlillemo@umich.edu.

Supervisors

- Identify jobs requiring respiratory protection and inform employees of these requirements;
- Assure that employees are issued respiratory protection through the procedures outlined in this Guideline as well as ensure that all employees engaged in such work use the appropriate respirators when required, and follow the elements of this program;
- Perform periodic work site inspections to determine whether or not the respirators are still necessary; and
- Ensure compliance with respirator change-out schedules.
- Return tight fitting respirators to EHS when the employee is no longer required to perform tasks requiring respirator use.

Employees

- Wear the appropriate respiratory protective equipment and wear it in the manner in which they were trained.
- Report any malfunction of their respirator to the EHS department immediately.
- Attend scheduled training and fit testing.

Procedures-General

The following elements are necessary to comply with the Respiratory Protection Guideline:

- Hazard determination and equipment selection;
- Employment status and medical clearance;
- Fit Testing and Fit Checking;
- Maintenance, care, and use of respiratory equipment;
- Assurance of appropriate air quality for air supplying respirators;
- Annual training on respirator use;
- Program evaluation; and
- Recordkeeping.

Hazard Determination and Equipment Selection

A respiratory hazard assessment is required for jobs in which employees may be exposed to breathing air contaminated with harmful levels of dusts, fumes, sprays, mists, fogs, smokes, vapors, gases or radioactive materials in order to ensure selection of appropriate respiratory equipment.

Hazard Determination

The EHS Representative for the area can assist in the determination of the degree of hazard and the need for respiratory protection. These evaluations are based on the identification of the contaminants, the estimated airborne concentration of the contaminants, the toxicity of the contaminants, the warning properties of the contaminant, and the oxygen content of the atmosphere.

Managers and/or supervisors shall contact the EHS Representative for their area prior to any non-routine work that may expose employees to hazardous substances where exposure determinations have not been made. This will allow for the proper evaluation of the job's exposures and the selection of the appropriate level of respiratory protection during and after the evaluation.

Equipment Selection

For each potential respiratory hazard, a NIOSH approved respirator will be designated by the EHS Representative that will be appropriate for the hazard involved. These respirator selections will include consultation with the applicable employee(s) and will be based on, but not limited to, the following factors:

- The nature of the hazardous operation or process;
- The type of respiratory hazard (including physical properties, physiological effects on the body, concentration of toxic material or airborne radioactivity level, and established *IDLH* concentration for the material);
- The warning properties of the respiratory hazard;
- The oxygen levels in the work area;
- The period of time for which respiratory protection **must** be provided and the potential stresses associated with the work activities during usage;
- The physical characteristics and limitations of the various types of respirators;
- Respirator assigned protection factors (APFs), *maximum use concentrations* (MUCs) and an individual's *fit test* results; and
- All applicable laws, regulations, and safety reference materials relating to the potential hazard.

Proper respirator selection depends on the particular work situation and selection should be based on the hazard determination. To ensure proper equipment selection and to ensure that the above listed factors are properly considered, the EHS Representative making the equipment selection is encouraged to use the selection process noted in the [NIOSH Respirator Selection Logic](#).

Also refer to [MIOSHA Respirator Assigned Protection Factors](#) and [Respirator Equipment Selection Guidance and the NIOSH Respirator Selection Logic Process](#).

Employment Status and Medical Clearance

Personnel **must** meet the criteria for employment status and Medical Surveillance to be included in the respiratory protection program.

Employment Status

The following personnel are eligible for respiratory protection once Medical Surveillance has been successfully completed:

- Faculty
- Staff
- Teaching Assistants
- University paid graduate research assistants (University paid is defined as anyone receiving a University of Michigan paycheck. Payment via grant monies does not qualify as University paid.)
- University paid Work Study Students

Respiratory protection is not available through EHS for individuals not on the University payroll. If other individuals wish to use respirators, EHS will provide a list of safety supply companies upon request.

Medical Surveillance

Using a respirator may place a physiological and/or psychological burden on employees that varies with the type of respirator worn, the job and workplace conditions in which the respirator is used, and the medical status of the employee.

Therefore, all employees **required** to wear a respirator (including the required use of filtering facepieces, dust mask, N95) will be medically cleared to do so by a University paid medical provider ([U-M Occupational Health Services](#)) prior to initial fit testing.

Employees shall not be assigned to tasks requiring the use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. A *PLHCP* designated by the University will conduct medical surveillance. The evaluation can be accomplished by use of a medical questionnaire, by examination or a combination of both. EHS works closely with the medical provider to ensure all required information is provided.

Initial Medical Evaluation

The following is applicable to all required users of filtering facepieces and any other user of respirators:

- The employee's supervisor will fill out and submit online a [Medical Surveillance Request Form](#). Upon EHS's review and approval, the employee will be sent a questionnaire that **must** be completed during normal working hours and in a confidential manner and returned to the clinic. EHS will also provide to the PLHCP information on individual types of respirators, duration and frequency of use, physical work effort, other Personal Protective Equipment (PPE) worn and the temperature and humidity extremes that exist in the work environment for the PLHCP's determination consideration.
- Based on this medical review, the examining PLHCP will determine whether or not an employee can wear a respirator without physical or psychological risk or may request the employee be scheduled for a physical. The employee will be contacted directly by the clinic to schedule an appointment in this case.
- Approval, non-approval, and any medical restrictions for an employee regarding respirator use will be communicated to the EHS Department by means of a PLHCP's written medical opinion that only includes information about any medical limitations on respirator use, the need, if any, for a follow-up exam, and that the employee has been provided with a copy of the physician's written recommendation. EHS will maintain a copy of the physician's opinion in the employee's Medical Surveillance file.

Additional Medical Evaluations

At the time of the physical, the physician will determine the frequency of any re-evaluations, e.g., every one to three years. EHS will notify the supervisor when employees are due for re-evaluation.

Additional medical evaluations will also be provided when:

- An employee reports medical signs or symptoms that are related to respirator use;
- A physician, supervisor, or program administrator informs the employee of the need to be re-evaluated;
- Information from the respiratory protection program including observations from fit testing and program evaluation indicates a need for re-evaluation; and
- A change in workplace conditions that results in substantial physiologic or exposure burden placed upon the employee.

Medical Surveillance for Voluntary Respirator Use

Voluntary use of a filtering facepiece respirator (dust mask, N95 etc.) does not require medical evaluation. Ensure that they are not dirty or contaminated, that their use does not interfere with the employee's ability to work safely, and provide a copy of 1910.134 Appendix D to each voluntary wearer.

Voluntary use of any other respirator type will be allowed under the following conditions. The employee will have an initial medical evaluation using the medical questionnaire only. The frequency of any re-evaluations, e.g., one to three years, will be determined by a physician. Re-evaluations may include only the medical questionnaire or may include a physical examination.

Those employees whose medical evaluation (initial or otherwise) requires the use of a PAPR rather than allowing the use of a negative pressure air-purifying respirator will be accommodated.

Fit Testing and Fit Checking

All individuals required to wear a tight-fitting respirator **must** be qualitatively or quantitatively fit tested for that particular mask before use and annually thereafter (or when an employee has a radical facial structure change from weight loss or gain, dental changes, scarring, surgery, or other conditions, which interfere with the seal of the facepiece). All voluntary users of tight-fitting respirators will receive initial fit testing and then will be on a five year cycle. The voluntary use of dust masks/filtering facepieces do not require fit testing.

Additional fit testing will be conducted whenever the employee, supervisor, physician, or EHS Representative/Program Administrator makes visual observations of changes in the employee's physical condition that could affect the respirator fit. When an employee has successfully completed medical surveillance, that employee will be scheduled for training and fit testing by EHS. The employee and his/her supervisor will be notified of the appointment via e-mail. EHS will review the physician's opinion before conducting the fit test and training.

Every manufacturer designs facepieces to fit a broad section of the working population, but no single respirator will fit everyone. EHS carries respirators from several manufacturers, so the probability of properly fitting most workers is increased.

Sight-impaired users **must** be fitted with prescription glass inserts for use inside full-facepiece respirators. Employees will be provided with safety prescription eyewear through the University Prescription Eyewear Program. (Refer to EHS's [Procedures for Obtaining Prescription Safety Glasses](#)).

In lieu of glass inserts, contact lenses may be worn with full-facepiece respirators if they are rigid gas permeable or soft (hydrophilic) lenses, *except in atmospheres containing acrylonitrile, methylene chloride, 1,2-dibromo-3-chloropropane, ethylene oxide, and methylene dianiline.*

Hard, nonpermeable lenses shall not be worn with full-facepiece respirators.

Individuals with facial hair that interferes with the face-to-facepiece seal of tight-fitting respirator facepieces will not be fit tested and these individuals shall not wear a respirator. Employees **must** be clean-shaven in order to receive a fit test. Employees with noticeable beard growth (more than 24-hours) will be asked to shave before receiving a fit test. Facial hair that does not interfere with the seal or the valve function of the respirator may be allowed.

In order to assure a proper fit, employees will be instructed in how to conduct a negative and positive fit check and one quantitative fit test. Qualitative fit testing may be done in certain circumstances.

Fit Checking

Each time a respirator is donned, the user **must** perform positive and negative pressure seal checks. Respirator users will be properly trained in the performance of these checks and provided an understanding of their limitations.

Negative Pressure Seal Check

Applicability – This test can only be carried out on facepieces of air-purifying respirators equipped with tight-fitting respirator inlet covers and on *atmosphere-supplying respirators* equipped with breathing tubes which can be squeezed or blocked at the inlet to prevent the passage of air.

Close off the inlet opening of the respirator's *canister(s)*, *cartridge(s)*, or filter(s) with the palm of the hand, or squeeze the breathing air tube or block its inlet so that it will not allow the passage of air. Inhale gently and hold for at least 10-seconds. If the facepiece collapses slightly, and no inward leakage of air into the facepiece is detected, it can be reasonably assumed that the respirator has been properly positioned and the exhalation valve and facepiece are not leaking.

Positive Pressure Seal Check

This test can only be carried out on respirators equipped with exhalation valves.

Close off the exhalation valve or the breathing tube with the palm of the hand. Exhale gently. If the respirator has been properly positioned, a slight positive pressure will build up inside the facepiece without detection of any outward air leak between the sealing surface of the facepiece and the face. It can be reasonably assumed that the respirator has been properly positioned and the inhalation valves are not leaking.

Fit Testing

Quantitative Fit Test

EHS uses quantitative fit testing in lieu of *qualitative fit tests* when feasible.

- Portacount Quantitative Test
 - This test is conducted by installing a probe within the respirator that allows the Portacount test unit to measure air particle concentrations inside and outside of the mask. The respirator wearer is instructed to perform various exercises during the testing period and an overall fit factor is calculated to determine if the respirator provides adequate protection if worn properly.

Qualitative Fit Test

When it is necessary, qualitative fit testing can be an option for fit testing certain types of respirators and uses. Refer to [Qualitative Fit Testing Option Guidance](#), for guidance on acceptable qualitative fit testing circumstances. Below is a type of qualitative fit test protocol that may be used:

- Bitrex™ (Denatonium Benzoate) / Saccharin Test
 - The employee is exposed to either Bitrex (creates an unmistakable bitter taste) or Saccharin (produces a sweet taste) while wearing a respirator equipped with particulate filters. If the wearer detects odor or taste, an adjustment to the respirator is necessary.

Respirator fit tests are documented and include the type of respirator, brand name and model, method of test, test date, and name of tester.

Maintenance, Care, and Use of Respiratory Equipment

The employee and their department are responsible for ensuring that respirators are properly used and cared for. This includes proper cleaning and disinfecting, storage, inspections, and proper cartridge/filter change-out and management.

Specific cleaning and disinfecting, storage, and inspection procedures can be found in the following training and respirator specific documents:

- [Information for Voluntary Users of Respirators \(1910.134 Appendix D\)](#)
- [Inspection Guidance for Air-Purifying Respirators \(APRs\)](#)
- [Respirator Training Information \(For all Respirators except PAPRs, SARs, and SCBAs\)](#)
- [Specific Procedures for the Use of Powered Air-Purifying Respirators \(PAPRs\)](#)
- [Specific Procedures for Use of Supplied-Air Respirators \(SARs\)](#): (Currently, there are no users of SAR units at the University of Michigan. Should the use of SARs be established in the future, this document **must** be used in conjunction with the SAR Manufacturer's operation manual.)
- [Specific Procedures for Use of Self-Contained Breathing Apparatus \(SCBA\)](#)

Use of Respirators

- The employees and their department shall ensure that respirators are used as set forth in this Guideline.
- Employees shall leave the respirator use area if they detect vapor or gas *breakthrough*, changes in breathing resistance or leakage of the facepiece.

Cartridge Change Schedule

- Respirator cartridges shall be changed before the end of their *service life*. For cartridges with an *End-of-Service-Life Indicator* (ESLI), e.g. mercury, replace the cartridges when indicated by color change. In the absence of an ESLI, EHS generally recommends that gas/vapor cartridges be changed every six months, at a minimum.

Cartridges designed for protection against particulates, e.g., *HEPA* filters, should be changed out once breathing resistance is noted, or every six months, whichever comes first. The EHS representative assigned to a specific area may recommend a more specific and/or frequent change-out schedule if necessary based on the following guidance:

- Many variables exist that influence the service life of respirator cartridges. Some of these include characteristics and concentration of contaminant, amount and characteristics of filter media, breathing rate, temperature, and humidity.
- Cartridge life expectancy for those chemicals and activities that have been identified as respirator required tasks should be estimated whenever possible using calculators provided by respirator manufacturers that have been made available through the manufacturer's website. The following manufacturers of respirators used at the University have made cartridge life expectancy calculators available at the following links:
 - [North/Honeywell –Service Life of North Chemical Cartridges & Service Life Estimator](#) - (Must create an account to access.)
 - [3M—Respirator Cartridge and Filter Replacement Program](#)

-
- Please refer to [Cartridge Change-Out Schedules/Cartridge Life Expectancies](#) for contaminant specific end-of-service-life information as well as an example printout from the SURVIVAIR® ESLI calculator using m-xylene.
 - OSHA also has also developed a [Respiratory Protection eTool](#) for calculating cartridge change out schedules.
 - Respirator cartridge change-out schedules should be documented and kept on file in the applicable department, if there is a deviation from the general 6 month change-out schedule. Change-out schedules should also be documented on the applicable “Information to the Physician” document by department code.

The change-out schedules should be communicated to the applicable respirator users during training with proof of that training filed in the employee’s fit test/medical surveillance file.

- The fit test record and training documentation form used during the annual training and fit test event should include a place for the fit test technician to fill in the applicable cartridge change-out information, which he/she will obtain from the “Information to Physician” document.
- Replacement cartridges are available at the EHS office.

Assurance of Appropriate Air Quality for Air Supplying Respirators

Breathing air **must** meet the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989.

These requirements include:

- Oxygen (O₂) content of 19.5 – 23.5%;
- Hydrocarbon (condensed) content of 5 milligrams per cubic meter (mg/m³) of air or less;
- Carbon monoxide (CO) content of 10 ppm or less;
- Carbon dioxide (CO₂) content of 1,000 ppm or less; and
- Lack of noticeable odor.

Breathing air from a cylinder **must** have moisture content in the cylinder that does not exceed a dew point of -50°F (-45.6°C) at one atmosphere pressure.

See the attachments entitled, [Specific Procedures for Use of Self-Contained Breathing Apparatus](#) and [Specific Procedures for Use of Supplied-Air Respirators](#) for air quality information specific to those protective devices.

Annual Training on Respirator Use

For respirators other than PAPRs, SARs, and SCBAs, employees will be trained by EHS staff on proper respirator usage at the time of fit testing. Voluntary users of respirators (including filtering facepieces) will be supplied, at a minimum, with MIOSHA “Information for Voluntary Users of respirators” (1910.134 Appendix D) information located in [Information for Voluntary Users of Respirators](#). It is suggested that supervisors of employees wearing respirators also receive training in order to aid in ensuring employees are using respirators properly.

Training includes information on the following areas:

- Why respiratory protection is necessary and the consequences of misuse;
- The limitations and capabilities of each respirator to be worn;
- What to do in any emergency while wearing a respirator;
- How to inspect, put on and remove, use, and check seals;
- Steps of proper maintenance and storage of the respirator; and
- Potential adverse medical effects of respiratory use.
- If respirator use is no longer required due to change in job duties return respirator to EHS.

See [Respirator Training Information](#) for training information on respirators other than PAPRs, SARs, and SCBAs and a checklist used for training.

Employees designated as *authorized users of SCBA* during emergencies **must** attend the EHS Emergency Response Training Program annually and will test use of SCBA periodically as needed. This training will include practice putting on and removing the SCBA under the observation of the EHS department.

Program Evaluation

The Program Administrator will ensure that periodic evaluations of the respirator program are done to ensure that the provisions of the written respirator program are being effectively implemented. The Program Administrator will also ensure that periodic respirator user consultations are conducted to determine its effectiveness and to identify any problems

- A formal evaluation shall be conducted at least annually and shall be done using the [Respirator Program Assessment Protocol](#).
- Respirator user consultations via a survey of randomly selected respirator wearers will be done using the [Respirator User Survey Form](#). Factors that will be assessed include:
 - Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);
 - Appropriate respirator selection for the hazards to which the employee is exposed;
 - Proper respirator use under the workplace conditions the employee encounters; and
 - Proper respirator maintenance.

Recordkeeping

- Training
 - The EHS department will maintain training records.
- Medical Evaluations
 - Confidential medical records will be retained by the administering clinic for the duration of the employee's employment plus 30 years. The PLHCP's written medical opinions will be maintained by EHS for the duration of the employee's employment plus 30 years.
- Fit Testing
 - The EHS department will retain a record of the fit test of each employee required to wear a respirator for the duration of the employee's employment, plus 30 years. The record will contain:
 - The name and University of Michigan ID (UMICH ID) number, if available, of the person tested;
 - The date of issue/test;
 - The type of respirator fit test used;

-
- The specific make and model of the respirator issued;
 - The type and amount of cartridges and/or filters issued;
 - The success or failure of the person to obtain a satisfactory fit during the test;
 - The signature of EHS representative administering the test; and
 - The signature of the tested individual indicating he/she was fit tested and trained on proper usage, cleaning, storage, and limitations of the respirator.
- Inspection
 - Emergency use respirators will be inspected monthly and the record kept for one year. These records will specify the inspection date, name of inspector, findings, remedial action, and a means to identify the respirator. Inspections will be kept in the area of respirator storage.
 - Program Evaluation
 - The EHS department will maintain the records related to the periodic evaluation of the program effectiveness and implementation for at least 2 years.
 - Air Quality
 - EHS's Hazardous Materials Management (HMM) arranges for semi-annual inspections of breathing air through an outside contractor. Certifications generated are kept on file at the NCTF (North Campus Transfer Facility) located at 1655 Dean Road. The air supply unit monitors for carbon monoxide (CO) and moisture content electronically.
 - HMM will maintain a log on the unit that will list the last inspection date and the date of the next inspection.
 - Purification cartridge change-out will be done when the need is indicated on the filter restriction gauge. This gauge will be visually checked during the monthly inspection.

Related Documents

[OSHA's Assigned Protection Factors for the Revised Respiratory Protection Standard](#)

Technical Support

All referenced Guidelines, regulations, and other documents are available through EHS (734) 647-1142. EHS also provides assistance in hazard evaluation, Medical Surveillance, and selection of respirators.

Attachments

- [MIOSHA Respirator Assigned Protection Factors](#)
- [Respiratory Equipment Selection and Guidance & NIOSH Respirator Selection Logic Process](#)
- [Qualitative Fit Testing Option Guidance](#)
- [Information for Voluntary Users of Respirators \(1910.134 Appendix D\)](#)
- [Inspection Guidance for Air-Purifying Respirators \(APRs\)](#)
- [Respirator Training Information \(For all Respirators except PAPRs, SARs, and SCBAs\)](#)
- [Specific Procedures for the Use of Powered Air-Purifying Respirators \(PAPRs\)](#)
- [Specific Procedures for Use of Supplied-Air Respirators \(SARs\):](#) *(Currently, there are no users of SAR units at the University of Michigan. Should the use of SARs be established in the future, this document **must** be used in conjunction with the SAR Manufacturer's operation manual.)*
- [Specific Procedures for Use of Self-Contained Breathing Apparatus \(SCBA\)](#)
- [Calculated Cartridge Life Expectancies](#)
- [Respirator Program Assessment Protocol](#)
- [Respirator User Survey Form](#)