
ADVISORY 11.1: RESPIRATORY PROTECTION GUIDELINES

POLICY STATEMENT

Effective April 4, 1998, OSHA has promulgated the final standard for respiratory protection, which supercedes the respiratory protection standard originally adopted in 1971. The State of Ohio Public Employer Risk Reduction Program (PERRP) mandated the adoption Federal OSHA regulations by public employers beginning in July 1992. State agencies and institutions are required to adopt any new Federal OSHA programs. As a public employer, the University is required to adopt the OSHA Respiratory Protection Standard 29 CFR 1910.134 (www.osha.gov/comp-links.html).

OSHA states: "In the control of those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective shall be to prevent atmospheric contamination. This shall be accomplished as far as feasible by accepted engineering control measures (for example, enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials). When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used pursuant to this section." The following are the key components of a respiratory program:

- A. Procedures for selecting respirators for use in the workplace.
- B. Medical evaluations of employees required to use respirators.
- C. Fit testing procedures for tight-fitting respirators.
- D. Use of respirators.
- E. Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations.
- F. Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators.
- G. Procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators.
- H. Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations.
- I. Training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance; and
- J. Procedures for regularly evaluating the effectiveness of the program.

Respirators applicable to the intended purpose shall only be provided to persons who:

- complete and submit the OSHA Respirator Medical Evaluation Questionnaire, and
- have been determined by a health care professional to be physically able to perform the work while wearing the appropriate respirator and
- are fit-tested for a respirator whose type & size provides adequate protection against the designated hazardous materials identified.

University Health Services at the University of Cincinnati shall provide a medical evaluation to determine the ability of an employee or student to use a respirator before the employee is fit-

tested or required to use a respirator in the workplace. Medical evaluations will be discontinued when there is no longer a requirement for respirator usage.

PROGRAM ADMINISTRATION

Environmental Health & Safety (EH&S) shall have authority for advising and assisting departments or other administrative units in the development and implementation of the required standards. The EH&S Chief OSHA Compliance Officer will serve as the program administrator and will work with departmental designees in developing their worksite-specific program. Responsibilities are as follows:

Environmental Health & Safety (EH&S) Shall:

- Identify and evaluate the respiratory hazard(s) in the workplace to include a reasonable estimate of worker exposures to respiratory hazard(s) and an identification of the contaminant's chemical state and physical form. §1910.134(d)(1)(iii) of the OSHA Standard states: "Where the employer cannot identify or reasonably estimate the worker's exposure, the employer shall consider the atmosphere to be IDLH" (Immediately Dangerous to Life and Health) §1910.134(d)(2)(iii) states: "All oxygen-deficient atmospheres shall be considered IDLH."
- Label the hazardous environments and conditions where the risk of exposure may require respirator usage to protect worker health.
- Recommend appropriate engineering control measures to prevent contamination of the environment and risk to human health.
- Refer the employee to University Health Services (UHS) for medical surveillance and a respirator fit test with the appropriate NIOSH-certified respirator in accordance with the provisions of this standard.
- Provide oversight for effective, required training to supervisors and employees who are required to use respirators.
- Maintain a database of departments, position titles, and employees whose work requires the use of respirators.
- Determine when respirator usage is no longer required and advise department heads and/or supervisors as appropriate.
- Retain a written copy of the University's current respirator program.

University Health Services (UHS) Shall:

- Review the OSHA Respirator Medical Evaluation Questionnaire and arrange for a health care professional to determine that the employee is physically able to perform the work while wearing the appropriate respirator.
- Schedule and provide fit-testing by a qualified provider in accordance with §1910.134 Appendix A. Ensure that the selected respirators are noted in Part A, Section 1, Question #11 of the mandatory OSHA Respirator Medical Evaluation Questionnaire.
- Ensure that a follow-up medical examination is provided for employees who give a positive response to any question among questions 1 through 8 in Section 2, Part A of Appendix C or whose initial medical examination demonstrates the need for a follow-up medical examination. The follow-up examination shall include any medical tests, consultations, or diagnostic procedures that the health care professional deems necessary to make a final determination.

- Provide a follow-up medical evaluation if a health care professional, supervisor, or the respirator program administrator informs UHS that an employee or student needs to be re-evaluated.
- Provide counseling on the use of contact lenses when certain types of respirators are used.
- Provide supervisors with a written recommendation regarding the employee's ability to use the respirator. The recommendation shall include only the following information:
 - Any limitations on respirator use related to the medical condition of the employee or relating to the workplace conditions in which the respirator will be used, including whether or not the employee or student is medically able to use the respirator;
 - The need, if any, for follow-up medical evaluations; and
 - A statement that the health care professional has provided the employee with a copy of the health care professional's written recommendation.
- Establish and retain written information regarding medical evaluations, fit testing, and the respirator program. This information will facilitate employee involvement in the respirator program, assist the University in auditing the adequacy of the program, and provide a record for compliance determinations by OSHA.
- Retain medical evaluations required by §1910.134 and make them available in accordance with 29 CFR 1910.1020.
- Establish a record of the qualitative or quantitative fit tests administered to an employee or student including:
 - The name or identification of the employee tested;
 - Type of fit test performed;
 - Specific make, model, style, and size of respirator tested;
 - Date of test; and
 - The pass/fail results for Qualitative Fit Tests (QLFTs) or the fit factor and strip chart recording or other recording of the results for Quantitative Fit Tests (QNFTs).
 - Retain fit test records for respirator users until the next fit test is administered.
 - Make written materials required to be retained by this Standard available to affected employees and to the Assistant Secretary or designee for examination and copying.

Supervisors (Area Zone Managers, Department Heads) Shall:

- Assign responsibility to Area Program Administrators if needed.
- Develop and implement written work-site specific procedures.
- Assist EH&S in determining the workers whose work requires the use of respirators and inform EH&S as names of the individuals or titles of the positions requiring the use of respirators change.
- Provide University Health Services (UHS) with the following supplemental information: [Note: supplemental information provided previously to UHS regarding an employee need not be provided for a subsequent medical evaluation if the information has not changed.]
- The type and weight of the respirator to be used by the employee,
- The duration and frequency of respirator use (including use for rescue and escape),

- The expected physical work effort,
- Additional protective clothing and equipment to be worn, and
- Temperature and humidity extremes that may be encountered.
- Ensure that each person required to use a respirator:
 - Completes the mandatory OSHA Respirator Medical Evaluation Questionnaire and submits it to University Health Services,
 - Receives respirator fit-testing at no cost to the person through referral arrangements made by University Health Services,
 - For persons using tight-fitting facepiece respirators, arrange for annual fit-testing, or re-testing whenever a different respirator facepiece (size, style, model, or make) is used.
 - Wears the appropriate respirator when performing work that requires respiratory protection,
- Maintains the facial hair conditions that were present during fit-testing so that a good facial seal with the respirator is obtained. Respirators with tight-fitting facepieces shall not be worn by employees who have:
 - Facial hair that comes between the sealing surface of the facepiece and the face, or that interferes with valve function; or
 - Any condition that interferes with the face-to-facepiece seal or valve function.
 - Does not allow corrective glasses or goggles, or other personal protective equipment to interfere with the seal of the facepiece to the face of the user.
- Performs a user seal-check each time the respirator is put on using procedures in §1910.134 Appendix B-1, or procedures demonstrated in training provided by Environmental Health and Safety.
- Replaces cartridges as needed, cleans and maintains the respirator provided for her/his protection in accordance with §1910.134 Appendix B-2.
- Be responsible for providing appropriate respirators, canisters or cartridges, respirator cleaning, repair, and maintenance supplies. Ensure that all filters, cartridges, and canisters used in the workplace are labeled and color-coded with the NIOSH-approval label that the label is not removed, and remains legible.
- Continue to monitor the chemical material(s) and environment(s) for appropriate canister or cartridge selection.
- Be responsible for storing respirators in a way that will protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals. Respirators shall be packed or stored to prevent deformation of the facepiece and the exhalation valve.
- Be responsible for providing training before requiring the employee to use a respirator in the workplace or other location. The training must be comprehensive, understandable, and recur annually or more often if necessary. Training should include, but is not limited to:
- Ensuring that each employee can demonstrate knowledge of at least the following:
 - Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.
 - What the capabilities and limitations of the respirator are.

- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.
- How to inspect, put on and remove, and check the seals of the respirator.
- Procedures for the storage and maintenance of the respirator.
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
- §1910.134 Appendix B-1 “User Seal Check Procedures”, and §1910.134 Appendix B-2 “Respirator Cleaning Procedures”.
- The basic information in §1910.134 Appendix D is to be provided to employees who wear respirators when not required to do so by this OSHA Standard or the University.
- Be responsible for making arrangements for medical evaluations, fit-testing, and training at no cost to the employee. Additional medical evaluations shall be provided if an employee reports medical signs or symptoms that are related to ability to use a respirator. Additional evaluations are required when a change occurs in workplace conditions (physical work effort, protective clothing, or temperature) that may result in a substantial increase in the physiological burden placed on an employee.
- Be responsible for the inspection of emergency use respirators, i.e., self-contained breathing apparatus (SCBA) and other equipment not assigned to a specific individual, and ensure that it is cleaned and disinfected after each use by persons using these devices.
- Ensure that emergency use respirators shall be:
 - Kept accessible to the work area,
 - Stored in compartments or covers that are clearly marked as containing emergency respirators, and
 - Stored in accordance with any applicable manufacturer instructions.
- Be responsible for providing a powered air purifying respirator (PAPR) if the respirator originally provided to the employee is a negative pressure respirator, and the health care professional finds a medical condition that may place the employee’s health at increased risk if the negative pressure respirator is used provided that the health care professional determines that a PAPR can be used. If a subsequent medical evaluation finds that the employee is medically able to use a negative pressure respirator, then the University is no longer required to provide a PAPR.
- Provide appropriate surveillance of work area conditions and degree of employee exposure or stress. When there is a change in work area conditions or degree of employee exposure or stress that may affect respirator effectiveness, re-evaluate the continued effectiveness of the respirator.
- Ensure that employees leave the respirator use area:
 - to wash their faces and respirator facepieces as necessary to prevent eye or skin irritation associated with respirator use,
 - if they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece,
 - to replace the respirator, filter, cartridge, or canister elements.

- Replace or repair the respirator before allowing the employee to return to the work area if they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece.
- Ensure that the information in §1910.134 Appendix D is provided to employees who wear respirators when not required to do so by this OSHA Standard or the supervisor or department head.

Employees Whose Work is Determined to Require the Wearing of Respirators Shall:

- Complete the mandatory OSHA Respirator Medical Evaluation Questionnaire and submit it to University Health Services,
- Receive respirator fit-testing arranged by University Health Services.
- Report medical signs or symptoms that are related to the ability to use a respirator, or physical condition changes that could affect respirator fit. Physical condition changes include: facial scarring, cosmetic surgery, dental changes, or an obvious change in body weight.
- Maintain respirator hygiene program described in §1910.134 Appendix B-2.

Employees Assigned to Wear Tight-Fitting Respirators* Shall:

- Wear the appropriate respirator when performing work that requires respiratory protection,
- Replace cartridges as needed, clean and maintain the respirator provided for her/his protection as often as necessary to keep it in a sanitary condition using the procedures outlined in §1910.134 Appendix B-2.
- Maintain the facial hair conditions that were present during fit-testing so that a good facial seal with the respirator is obtained. Respirators with tight-fitting facepieces shall not be worn by employees who have:
 - Facial hair that comes between the sealing surface of the facepiece and the face, or that interferes with valve function; or
 - Any condition that interferes with the face-to-facepiece seal or valve function.
 - Not allow corrective glasses or goggles, or other personal protective equipment to interfere with the seal of the facepiece to the face of the user.
- Leave the respirator use area:
 - to wash their faces and respirator facepieces as necessary to prevent eye or skin irritation associated with respirator use,
 - if they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece,
 - to replace the respirator, filter, cartridge, or canister elements.
- Replace or repair the respirator before returning to the work area if they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece.
- Read the information in §1910.134 Appendix D, if applicable, when respirators are worn when not required by this OSHA Standard or the supervisor or department head.
- Perform a user seal check in compliance with §1910.134 Appendix B-1 to ensure that an adequate seal is achieved each time the respirator is put on.

* A tight-fitting respirator has a facepiece with a respiratory inlet covering that forms a complete seal with the face.

One of the following three methods shall be used to perform a user seal check:

- Positive pressure check.
- Negative pressure check.
- Manufacturer's recommended user seal check procedures.

The **positive pressure check** is accomplished by closing the exhalation valve and *exhaling* gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. However, for most respirators this method requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

The **negative pressure check** is accomplished by closing off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), *inhaling* gently so that the facepiece collapses slightly, and holding the breath for ten seconds. If the design of the inlet opening cannot be effectively covered with the palm of the hand, the inlet opening can be covered with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition, and no inward leakage is detected, the tightness of the respirator is considered satisfactory.

Alternatively, the respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive or negative user seal check procedures outlined above provided that Environmental Health & Safety determines that the manufacturer's procedures are equally effective.

Respirators for Atmospheres that are Not Immediately Dangerous to Life and Health (IDLH):

Respirators provided for atmospheres that are *not* Immediately Dangerous to Life and Health (IDLH), shall be selected so as to be adequate to protect the health of the employee or student and ensure compliance with all other OSHA statutory and regulatory requirements under routine and reasonably foreseeable emergency situations. The respirator selected shall be appropriate for the chemical state and physical form of the contaminant.

For protection against gases and vapors, the respirator provided shall be either an atmosphere-supplying respirator, or an air-purifying respirator, provided that:

- The respirator is equipped with an end-of-service-life-indicator (ESLI) certified by NIOSH for the contaminant, or
- If there is no ESLI appropriate for conditions present in the workplace, a change schedule is implemented for canisters and cartridges that is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. If a change schedule is employed, the supervisor and the program administrator shall describe in the worksite-specific respirator program the information and data relied upon and the basis for the canister and cartridge change schedule and the basis for reliance on the data.

For protection against particulates, the respirator provided shall be either:

- an atmosphere-supplying respirator, or
- an air-purifying respirator equipped with a filter certified by NIOSH under 30CFR part 11 as a high efficiency particulate air (HEPA) filter, or
- an air-purifying respirator equipped with a filter certified for particulates by NIOSH under 42 CFR part 84; or

- for contaminants consisting primarily of particles with mass-median aerodynamic diameters (MMAD) of at least 2 micrometers, an air-purifying respirator equipped with any filter certified for particulates by NIOSH.

ATMOSPHERES IDENTIFIED AS IMMEDIATELY DANGEROUS TO LIFE AND HEALTH (IDLH):

Respirators for IDLH Atmospheres:

Respirators provided for atmospheres that are Immediately Dangerous to Life and Health (IDLH), including all oxygen-deficient atmospheres, shall be either:

- A full facepiece pressure demand self-contained breathing apparatus (SCBA) certified by NIOSH for a minimum service life of thirty minutes, or
- A combination full facepiece pressure demand supplied-air respirator (SAR) with auxiliary self-contained air supply.
- Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they are used.

Procedures for IDLH Atmospheres:

The supervisor or department head shall coordinate in advance any planned entry into an IDLH atmosphere with Environmental Health & Safety, 556-4968.

For all IDLH atmospheres, the supervisor or department head shall ensure that:

- One employee or student, or when needed, more than one is located outside the IDLH atmosphere;
- Visual, voice, or signal line communication is maintained between persons in the IDLH atmosphere and those located outside the IDLH atmosphere;
- The employees or students located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue;
- The supervisor, department head, or persons designated by them are notified before the persons located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue;
- The supervisor, department head, or persons designated by them, once notified, provides necessary assistance appropriate to the situation;
- Employees located outside the IDLH atmosphere are equipped with:
 - Pressure demand or other positive pressure SCBA's (self-contained breathing apparatus), or a pressure demand or other positive pressure supplied air respirator with auxiliary SCBA; and either:
 - Appropriate retrieval equipment for removing the persons inside the hazardous atmospheres where retrieval equipment would contribute to their rescue and would not increase the overall risk resulting from entry; or
 - Equivalent means for rescue where retrieval equipment is not required under the conditions described in the preceding paragraph.

RESPIRATORS MAINTAINED FOR USE IN EMERGENCY SITUATIONS:

Supervisors, department heads, or persons designated by them in administrative or academic units where respirators are maintained for use in emergency situations shall be responsible for compliance with the following:

Cleaning:

Respirators maintained for emergency use, e.g., self-contained breathing apparatus (SCBA) shall be cleaned and disinfected after each use.

Storage:

Store emergency use respirators in a way that will protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals. Respirators shall be packed or stored to prevent deformation of the facepiece and the exhalation valve.

- In addition, emergency use respirators shall be:
- Kept accessible to the work area,
- Stored in compartments or covers that are clearly marked as containing emergency respirators, and
- Stored in accordance with any applicable manufacturer instructions.

Inspection:

All respirators maintained for use in emergency situations shall be inspected at least monthly and in accordance with the manufacturer's recommendations, and shall be checked for proper function before and after each use.

Emergency escape-only respirators shall be inspected before being carried into the workplace for use.

Ensure that respirator inspections include the following:

- A check of respirator function, tightness of connections, and the condition of various parts including, but not limited to, the facepiece, head straps, valves, connecting tubes, and cartridges, canisters or filters, and a check of elastomeric parts for pliability and signs of deterioration.
- Self-contained breathing apparatus (SCBA) shall be inspected monthly. Air and oxygen cylinders shall be maintained in a fully charged state and shall be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level.
- A determination that the regulator and warning devices function properly.

Certification:

- Certify the respirator by documenting the date that the inspection was performed, the name (or signature) or the person performing the inspection, the findings, required remedial action, and a serial number of other means of identifying the inspected respirator, and
- Provide this information on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in inspection reports stored as paper or electronic files. This information shall be maintained until replaced by a subsequent certification.

Repairs:

Each department shall ensure that respirators that fail an inspection or are otherwise found to be defective are removed from service, and are discarded or repaired and adjusted in accordance with the following procedures:

- Repairs or adjustments to respirators are to be made only by persons appropriately trained to perform such operations and shall use only the manufacturer's NIOSH-approved parts designed for the respirator;

- Repairs shall be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed, and
- Reducing and admission valves, regulators, and alarms shall be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

Breathing Air Quality and Use:

Ensure that atmosphere-supplying respirators (supplied-air and SCBA) are provided with breathing gases of high purity. Compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration must be in accordance with the following specifications:

- Compressed and liquid oxygen shall meet United States Pharmacopoeia requirements for medical or breathing oxygen; and
- Compressed breathing air shall meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989, to include:
 - Oxygen content (v/v) of 19.5%--23.5%;
 - Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;
 - Carbon monoxide (CO) content of 10 ppm or less;
 - Carbon dioxide content of 1,000 ppm or less; and
 - Lack of noticeable odor.

Ensure that compressed oxygen is not used in atmosphere-supplying respirators that have previously used compressed air.

Ensure that cylinders used to supply breathing air to respirators meet the following requirements:

- Cylinders are tested and maintained as prescribed by the manufacturer in accordance with applicable regulations;
- Cylinders of purchased breathing air have a certificate of analysis from the supplier stating that the breathing air meets the requirements for Grade D breathing air; and
- The moisture content in the cylinder does not exceed a dew point of -50 degrees F (-45.6 degrees C) at 1 atmosphere pressure.

Ensure that compressors used to supply breathing air to respirators are constructed and situated so as to:

- Prevent entry of contaminated air into the air-supply system;
- Minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F (5.56 degrees C) below the ambient temperature;
- Have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters shall be maintained and replaced or refurbished periodically following the manufacturer's instructions.

Maintain a tag at the compressor citing the most recent change date for sorbent beds and filters and the signature of the person authorized by the department responsible for the compressor to make the change.

For compressors that are not oil-lubricated, ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm.

For oil-lubricated compressors, ensure that a high-temperature or carbon monoxide alarm, or both, are used to monitor carbon monoxide levels. If only the high-temperature alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.

Ensure that breathing air couplings are incompatible with outlets for non-respirable work site air or other gas systems. No asphyxiating substance shall be introduced into breathing air lines.

Ensure that breathing gas containers are marked in accordance with the NIOSH respirator certification standard, 42 CFR part 84.