

DEPAUL UNIVERSITY

## Respiratory Protection Program

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Environmental Health & Safety

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## **1.0 INTRODUCTION**

The purpose of the DePaul University (DPU) Respiratory Protection Program is to protect the health of employees in accordance with the Occupational Safety and Health Administration's (OSHA) Respiratory Protection Standard, 29 CFR 1910.134. Respirators shall be used to protect against harmful dusts, fibers, fumes, mists, gases, smokes, sprays, bio-aerosols, and vapors.

When possible, occupational exposures caused by breathing contaminated air must be controlled through the use of feasible engineering controls such as the use of general and local ventilation systems, confinement of the operation, or substitution of less toxic materials. When effective engineering controls and other types of workplace controls (administrative, product substitution, etc.) are not feasible, or while they are being instituted, appropriate respirators shall be provided and used. The use of respirators is the last line of defense to protect employees from inhalation hazards.

## **2.0 RESPONSIBILITIES**

### **2.1 Supervisors and Principal Investigators**

Supervisors have the primary responsibility for implementation of the Respiratory Protection Program in their work area. This involves:

- Supervising employees to ensure that the Respiratory Protection Program elements are followed.
- Identifying employees and their jobs or tasks which may require respiratory protection, providing this information to the Environmental Health & Safety Office, and seeking their assistance in evaluation of respiratory hazards.
- Purchasing appropriate respirators and making them available for authorized use by respirator users.
- Enforcing the proper use of respiratory protection.
- Ensuring that respirators are properly cleaned, maintained and stored according to this program.
- Ensuring that respirator users under their supervision (including new hires) receive appropriate training, fit testing and annual medical evaluation.
- Identifying changes in jobs or tasks which may require re-evaluation of the respirator use and notifying the EHS.
- Maintaining, storing, and monthly inspection of emergency use respirators as required, ensuring that they are readily accessible and operational when needed.

### **2.2 Environmental Health and Safety**

The Environmental Health & Safety Office is responsible for the development, implementation and administration of the DePaul University Respiratory Protection Program.

- Reviewing and updating the written Respiratory Protection Program.
- Evaluating respiratory hazards in the work areas.
- Providing guidance to supervisors for the selection and purchase of approved respirators.

- Providing affected employees with yearly no cost medicals and training on the proper use, maintenance, and storage of respirators to all respirator users, including Self Contained Breathing Apparatus (SCBA).
- Providing a fit testing program for respirator users.
- Maintaining records on respiratory protective equipment assignments, fit testing and training.
- Evaluating the overall effectiveness of the respirator program.

## 2.3 Respirator User

The respirator user is responsible for following the requirements of the written program. This involves:

- Using the respirator in accordance with the manufacturer's instructions and the training received.
- Storing, cleaning, maintaining, and guarding against damage to the respirator.
- Reporting any malfunction of the respirator to their supervisor.
- Inspecting the respirator before each use.
- Promptly reporting to their supervisor any symptoms of illness that may be related to respirator usage or exposure to hazardous atmospheres.
- Informing the supervisor of operational changes or health status changes that could affect the safe use of the equipment.

## 2.4 Licensed Health Care Professional

The licensed health care professional is responsible for ensuring that employees are medically fit to wear and use a respirator. This involves:

- Performing yearly medical evaluations and any necessary follow-up examinations of employees to determine their ability to wear a respirator.
- Reviewing medical questionnaire information.
- Granting approval for respirator usage.
- Retaining necessary confidential medical records.
- Notifying Environmental Health & Safety of potential problems reported by employees and/or any potential problems observed during the medical examination.
- Providing a written evaluation of the employee's ability to use a respirator to Environmental Health & Safety.

## **3.0 WORKPLACE EXPOSURE ASSESSMENT**

Whenever supervisors identify substances, processes, or equipment that may represent an occupational safety and health hazard, they shall contact Environmental Health & Safety Office to provide workplace exposure assessment. Based on data collected, the need for respiratory protection is determined.

## **4.0 RESPIRATOR SELECTION**

Selection of a respirator for a specific operation and/or contaminants shall be made by the employee's supervisor. Selection shall be made from a sufficient number of models and sizes to allow proper fit.

#### **4.1 General Considerations**

The selection of a proper respirator for any given situation shall require evaluation of workplace respiratory hazards, including identification of the following:

- A reasonable estimate of employee exposure to respiratory hazards.
- The contaminant's chemical state (valence state) and physical form (gas, vapor, particulate, etc.).

#### **4.2 Approved Respirators, Filters, Cartridges, and Canisters**

- Only respirators certified by the National Institute of Occupational Safety and Health (NIOSH) shall be selected.
- All appropriate filters, cartridges, and canisters shall be labeled and color coded with the NIOSH approval label. Labeling shall not be removed and shall remain legible.

#### **4.3 Respirators for Use in IDLH Atmospheres**

The only types of respirators authorized for use in an IDLH (immediately dangerous to life and health) atmosphere are:

- Full facepiece pressure demand SCBA (self-contained breathing apparatus) certified by NIOSH for a minimum service duration of 30 minutes
- A combination full facepiece pressure demand supplied-air respirator with auxiliary self-contained air supply or
- For uses in emergency escape from IDLH atmospheres, respirators shall be NIOSH-certified for escape from the specific IDLH atmospheres involved.

#### **4.4 Respirators for Use in Non-IDLH Atmospheres**

##### **4.4.1 Protection against Gases, Vapors and Particulates**

As appropriate, respirator users shall be provided either an air-supplying respirator or an air-purifying respirator.

#### **5.0 Voluntary use of Dust Masks**

OSHA's respiratory protection program allows the use of dust masks as good practice on a voluntary basis. DePaul University employees have the option to use dust masks whenever they feel a situation or task may be dusty or wish to avoid conditions such as pollen exposure when cutting lawns, using leaf blowers, changing filters in HVAC systems etc. None of these exposures would normally exceed recommended exposure limits but the use of a dust mask may be considered good practice to avoid unwanted particulate exposures or employee discomfort.

OSHA rules require that each employer allowing voluntary use of dust masks train employees about general safety issues related to their use and require that employees notify their supervisor if they believe the exposure may be hazardous.

If your supervisor provides dust masks for your voluntary use, or if you provide your own, you need to take certain precautions to be sure that the mask itself does not present a hazard. You should do the following:

- Read and follow all instructions provided by the manufacturer on use, maintenance, cleaning and care, and heed all warnings regarding the dust masks limitations.
- Choose a dust mask 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 dust masks. A label or statement of certification should appear on the dust mask or the packaging. It will tell you what the mask is designed for and how much it will protect you.
- Do not wear your dust mask into atmospheres containing contaminants for which it is not designed to protect against. For example, a dust mask designed to filter dust particles will not protect you against gases, vapors, fumes, or smoke.
- Keep track of your dust mask so that you do not mistakenly use someone else's.
- Discard and replace disposable masks when they become soiled, damp or in any way contaminated.

## **6.0 MEDICAL EVALUTION**

A medical evaluation is required by OSHA's Respiratory Protection Standard (29 CFR 1910.134) for employees who MUST wear respirators, the only exception to this rule is the voluntary use of dust masks. OSHA requires that the medical evaluation consist of, at minimum:

- Completion of the OSHA Medical Questionnaire for Respiratory Protective Equipment by the employee and review of the questionnaire by a licensed health care professional. This requirement is intended to ensure that employees are physically able to wear a respirator.
- A DePaul University employee required to use a respirator must, on an annual basis, receive medical approval from a licensed health care professional prior to respirator use.

## **7.0 TRAINING**

Employees are to be trained regarding the respiratory hazards to which they may be exposed during routine and emergency situations, and in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance. The training must be comprehensive, understandable, and be prior to requiring the employee to use a respirator in the workplace. Retraining is to be administered annually, and when the following situations occur:

- Changes in the workplace or the type of respirator render previous training obsolete.
- Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill.

- Any other situation arises in which retraining appears necessary to ensure safe respirator use.

Each employee is to 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.
- The limitations and capabilities of the respirator. How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.
- How to inspect, put on and remove, use, and check the seals of the respirator.
- Procedures for maintenance and storage of the respirator.
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators. The general requirements of the OSHA Respiratory Protection Standard.

## **8.0 RESPIRATOR FIT TESTING**

The Respiratory Protection Program shall provide qualitative and/or quantitative respirator fit tests for individuals prior to approval to use respirators with a negative or positive pressure tight-fitting facepiece. If an employee uses more than one type of respirator, they must be fit tested on all respirators before use.

### **8.1 Qualitative Fit Test**

Qualitative fit testing is a pass/fail test method that uses the sense of taste or smell, or reaction to an irritant in order to detect leakage into the respirator facepiece. Qualitative fit testing does not measure the actual amount of leakage. Whether the respirator passes or fails the test is based simply on detecting leakage of the test substance into facepiece. There are four qualitative fit test methods accepted by OSHA:

- Isoamyl acetate, which smells like bananas.
- Saccharin, which leaves a sweet taste in the mouth.
- Bitrex, which leaves a bitter taste in the mouth.
- Irritant smoke, which can cause coughing.

Qualitative fit testing is normally used for half-mask respirators - those that just cover your mouth and nose. Half-mask respirators can be filtering facepiece respirators - often called "N95s" - as well as elastomeric respirators.

### **8.2 Quantitative Fit Test**

Quantitative fit testing uses a machine to measure the actual amount of leakage into the facepiece and does not rely upon the sense of taste, smell, or irritation in order to detect leakage. Respirators used during this type of fit testing will have a probe attached to the facepiece that will be connected to the machine by a hose. There are three quantitative fit test methods accepted by OSHA:

- Generated aerosol.
- Ambient aerosol.
- Controlled Negative Pressure.

Quantitative fit testing can be used for any type of tight-fitting respirator.

## **9.0 RESPIRATOR USE**

### **9.1 Facepiece Seal Protections**

Any tight-fitting facepiece respirator shall not be worn when conditions prevent a proper seal of the respirator to the wearer. Common facepiece seal problems and remedies include:

- Facial hair interference— shaving facial areas that interfere with the face-to-facepiece seal or areas that interfere with respirator valve function.
- Glasses interference – ensure glasses are worn in a way to avoid facepiece seal interference.

### **9.2 Cartridge Change Schedules**

Since respirators are not used on a daily basis, a new cartridge will be installed before each use and disposed after.

### **9.3 Continuing Respirator Effectiveness**

When there is a change in work area conditions, degree of employee exposure, or employee physical stress that may affect respirator effectiveness, the employee shall request their supervisor to contact Environmental Health & Safety for a re-evaluation of respiratory hazards

### **9.4 Procedures for IDLH Atmospheres**

Note: All currently identified IDLH atmospheres at DePaul exist within spaces which are defined as permit-required confined spaces. As outlined in the Confined Space Program, no University employee shall, at any time, enter a permit required confined space. All permit required work shall be contracted out. ([See DePaul Confined Space Program for more information](#)).

## **10.0 MAINTENANCE AND CARE OF RESPIRATORS**

### **10.1 Respirator Repair**

Respirators which do not pass inspection shall be removed from service and brought to the supervisor's attention immediately.

- Minor repairs (such as replacing valves for air-purifying respirators or replacing straps) shall be made as specified by the respirator manufacturer's instructions, using the manufacturer's NIOSH-approved parts.
- No attempt shall be made to replace components, or make adjustments, modifications or repairs beyond the manufacturer's recommendation. If a respirator cannot be user-repaired

according to the manufacturer, the unit shall be disposed of or the manufacturer should be contacted for further assistance.

- Reducing and admission valves, regulators, and alarms shall be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

#### 10.2 Breathing Air Quality for Supplied-Air Respirators and SCBAs

Supervisors shall ensure that employees using atmosphere-supplying respirators (supplied-air and SCBA) be supplied with breathing gases of high purity.

#### 10.3 Cleaning and Disinfecting Respirators

Employees are to be provided with respirators that are clean, sanitary, and in good working order. Respirators are to be cleaned and disinfected using the following procedures, or equivalent procedures recommended by the respirator manufacturer:

- Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Wash components in water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt. Rinse components thoroughly in clean, warm, running water.
- When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in a commercially available cleanser of equivalent disinfectant quality and used as directed.
- Rinse components thoroughly in clean, warm, running water. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
- Components should be hand-dried with a clean, lint-free cloth or air-dried.

Respirators are to be cleaned and disinfected at the following intervals:

- Respirators issued for the exclusive use of an employee are to be cleaned and disinfected by the employee as often as necessary to be maintained in a sanitary condition.
- Respirators issued to more than one employee are to be cleaned and disinfected before and after being worn by different individuals.
- Respirators maintained for emergency use are to be cleaned and disinfected after each use.

Respirator users are responsible for cleaning and sanitizing their respirators after each use.

#### 10.4 Storage

All respirators are to be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals. They are to be packed or stored to prevent deformation of the facepiece and exhalation valve.

Emergency respirators are to be kept accessible to the work area, stored in compartments or in covers that are clearly marked as containing emergency respirators, and stored in accordance with any applicable manufacturer instructions.

## 10.5 Inspection

All respirators used in routine situations are to be inspected before each use and during cleaning. Respirator inspections are to include the following:

- A check of respirator function, tightness of connections, and the condition of the various parts including, but not limited to; the facepiece, head straps, valves, connecting tube, and cartridges, canisters or filters.
- A check of elastomeric parts for pliability and signs of deterioration.
- All respirators maintained for use in emergency situations are to be inspected at least monthly in accordance with the manufacturer's recommendations, and are to be checked for proper function before and after each use. Emergency escape-only respirators are to be inspected before being carried into the workplace for use.
- Self-contained breathing apparatus (SCBA) are to be inspected monthly. Air and oxygen cylinders are to be maintained in a fully charged state and are to be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level. The inspection is to include a determination that the regulator and warning devices function properly.

## 10.6 SCBA Cylinder Hydrostatic Testing

Hydrostatic testing is the most common way to check a SCBA cylinder for leaks or flaws. During a hydrostatic test, the cylinder is examined to ensure it can safely hold its rated pressure. SCBA cylinder hydrostatic testing is crucial as such containers can explode if they fail when containing compressed gas.

A hydrostatic test consists of filling the cylinder with a nearly incompressible liquid—usually water—and examining it for leaks or permanent changes in shape. The test pressure is always considerably more than the operating pressure to give a margin for safety. Typically, 150% of the operating pressure is used. Water is commonly used as it is almost incompressible and will only expand by a very small amount. If high-pressure gas was used, the gas could expand up to several hundred times its compressed volume, running the risk of serious injury.

All SCBA cylinders require periodic hydrostatic testing as required by 49 CFR 180.205. The frequency of the maintenance depends upon the cylinder material.

- Steel cylinders should be tested every five years and have an indefinite service life until they fail a hydro test
- Aluminum cylinders (not including hoop-wrapped) should be tested every five years and have an indefinite service life until they fail a hydro test
- Hoop-wrapped cylinders should be tested every three years and have a 15-year service life.
- Fully wrapped fiberglass cylinders should be tested every three years and have a 15-year service life.

- Fully wrapped Kevlar cylinders should be tested every three years and have a 15-year service life.
- Fully wrapped carbon fiber cylinders should be tested every five years and have a 15-year service life.

#### **10.7 Documentation of inspections**

Documentation of inspection for respirators maintained for emergency use is to be provided on a tag or label that is attached to the storage compartment for the respirator, kept with the respirator, or included in inspection reports stored as paper or electronic files. This information is to be maintained until replaced following a subsequent certification. The documentation is to include:

- The date the inspection was performed.
- The name (or signature) of the person who made the inspection.
- The findings.
- Required remedial action.
- A serial number or other means of identifying the inspected respirator.

#### **11.0 RECORDKEEPING**

The Environmental Health & Safety office will ensure that records of the following are maintained:

- Medical evaluation: Environmental Health and Safety will maintain the medical clearance form and the licensed health care professional will maintain the questionnaires and any additional documentation
- All documentation from the Respirator training (fit testing).
- Written copy of the current Respiratory Protection Program.

## 12.0 APPENDIX A: OSHA Respirator Medical Evaluation Questionnaire (Mandatory)

Go to:

[https://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=standards&p\\_id=9783](https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9783)

**13.0 APPENDIX B: DEFINITIONS.** The following definitions are important terms used in the respiratory protection standard in this section.

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

**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 this section.

**Atmosphere-supplying respirator** means a respirator that supplies the respirator 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.

**Canister or cartridge** means a container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.

**Demand respirator** means an atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

**Emergency situation** means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

**Employee exposure** means exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection.

**End-of-service-life indicator (ESLI)** means 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.

**Escape-only respirator** means a respirator intended to be used only for emergency exit.

**Filter or air purifying element** means a component used in respirators to remove solid or liquid aerosols from the inspired air.

**Filtering facepiece (dust mask)** means 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.

**Fit factor** means a quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

**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.)

**Helmet** means a rigid respiratory inlet covering that also provides head protection against impact and penetration.

**High efficiency particulate air (HEPA) filter** means a filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.

**Hood** means a respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.

**Immediately dangerous to life or health (IDLH)** means 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.

**Interior structural firefighting** means the physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures which are involved in a fire situation beyond the incipient stage. (See 29 CFR 1910.155)

**Loose-fitting facepiece** means a respiratory inlet covering that is designed to form a partial seal with the face.

**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 assigned protection factor of the respirator or class of respirators and the exposure limit of the hazardous substance. The MUC can be determined mathematically by multiplying the assigned protection factor specified for a respirator by the required OSHA permissible exposure limit, short-term exposure limit, or ceiling limit. When no OSHA 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.

**Negative pressure respirator (tight fitting)** means a 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** means an atmosphere with oxygen content below 19.5% by volume.

**Physician or other licensed health care professional (PLHCP)** means 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 required by paragraph (e) of this section.

**Positive pressure respirator** means a respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

**Powered air-purifying respirator (PAPR)** means an air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

**Pressure demand respirator** means a positive pressure atmosphere-supplying respirator that admits

breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

**Qualitative fit test (QLFT)** means a pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the 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.

**Respiratory inlet covering** means that portion of a respirator that forms the protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both. It may be a facepiece, helmet, hood, suit, or a mouthpiece respirator with nose clamp.

**Self-contained breathing apparatus (SCBA)** means an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

**Service life** means the period of time that a respirator, filter or sorbent or other respiratory equipment provides adequate protection to the wearer.

**Supplied-air respirator (SAR) or airline respirator** means an atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

**This section** means this respiratory protection standard.

**Tight-fitting facepiece** means a respiratory inlet covering that forms a complete seal with the face.

**User seal check** means an action conducted by the respirator user to determine if the respirator is properly seated to the face.

## **14.0 APPENDIX C: PROGRAM HISTORY**

#### ACKNOWLEDGEMENTS

The DePaul University Environmental Health and Safety Office (EHS) using best practice examples from Occupational Safety and Health Administration (OSHA) developed this standard practice instruction.

EHS will review and evaluate this standard practice instruction on an annual basis, or when changes occur to 29 CFR 1910.1329 that prompt revision of this document.

Effective implementation of this program requires support from all levels of management at DePaul. This written program will be communicated to all personnel that are affected by it and will encompass the total workplace, regardless of the number of workers employed or the number of work shifts.