

PPPL	PRINCETON PLASMA PHYSICS LABORATORY ES&H DIRECTIVES	
	ES&HD 5008 SECTION 8, CHAPTER 7 Respiratory Protection	
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CHAPTER 7 RESPIRATORY PROTECTION

7.1 INTRODUCTION

Respirators are a relatively complex form of personal protective equipment. To provide effective protection, they must be carefully chosen, fitted, worn, and maintained. This section establishes a Respiratory Protection Program to help ensure their effective use and to meet the requirements of applicable regulations.

7.2 SCOPE

This section applies to all respirator use at PPPL.

7.3 DEFINITIONS

7.3.1 Air-Purifying Respirator (APR)- a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

7.3.2 Atmosphere-Supplying Respirator - a respirator that supplies the user with breathing air from a source independent of the ambient atmosphere. This includes supplied-air respirators (SAR) and self-contained breathing apparatus (SCBA).

7.3.3 Cartridge - a container with a filter, sorbent, and/or catalyst which removes specific contaminants from the air passed through the container.

7.3.4 Filtering Facepiece (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.

7.3.5 Fit Factor - a quantitative estimate of the fit of a respirator to an individual, the ratio of concentration of a substance in ambient air to the concentration of the substance within the respirator.

7.3.6 Fit Test - the use of a protocol to evaluate the fit of a respirator on an individual (Qualitative or Quantitative).

7.3.7 High Efficiency Particulate Air (HEPA) Filter - a filter that is at least 99.97% efficient in removing particles of 0.3 microns in diameter. NIOSH filters N100, R100 or P100.

7.3.8 Immediately Dangerous to Life or 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.

7.3.9 Loose-Fitting Facepiece - a respirator which is designed to form only a partial seal with the face.

7.3.10 Negative Pressure Respirator (tight fitting) - a respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

7.3.11 Oxygen Deficient Atmosphere - an atmosphere with an oxygen concentration below 19.5% by volume.

7.3.12 Physician or Other Licensed Health Care Professional (PLHCP or “Physician”) - an individual whose legally permitted scope of practice allows him or her to provide all of the health care services required in this chapter.

7.3.13 Positive Pressure Respirator - a respirator in which the pressure inside the respirator exceeds the ambient pressure outside the respirator.

7.3.14 Powered Air-Purifying Respirator (PAPR) - an air-purifying respirator that uses a blower to force the ambient air through air-purifying cartridges to the respirator inlet.

7.3.15 Pressure Demand Respirator - a positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

7.3.16 Qualitative Fit Test (QLFT) - a pass/fail fit test to assess the adequacy of respirator fit that relies on the individual’s response to the test agent.

7.3.17 Quantitative Fit Test (QNFT) - an assessment of the adequacy of a respirator fit by numerically measuring the amount of leakage into the respirator.

7.3.18 Respirator - Any device designed to protect the wearer from the inhalation of a hazardous atmosphere.

7.3.19 Respirator Qualified Employee - One who has successfully completed a medical qualification examination, respirator training, and fit testing requirements for a particular respirator. Respirator qualification must be repeated annually for each type of respirator used.

7.3.20 Self-Contained Breathing Apparatus (SCBA) - an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

7.3.21 Service Life - the period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer.

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

7.3.23 Tight-Fitting Facepiece - a respirator which is designed to form a complete seal with the face.

7.3.24 User Seal Check - an action conducted by the respirator user to determine if the respirator is properly seated on the face. Previously called "fit check".

7.4 POLICY

In the control of 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 such as enclosure of the operation, local exhaust ventilation, (See Chapter 4, "Ventilation"), and substitution of less toxic materials. When effective engineering controls are not feasible, administrative controls such as good work practices and procedures shall be implemented in addition to any engineering controls. If the combination of engineering and administrative controls are not effective enough, or while they are being instituted, appropriate respirators shall be used in accordance with this Chapter.

Only respirator-qualified employees shall be permitted to wear respirators for protection against hazardous air contaminants at PPPL.

In areas where respirators are required for health protection, employees shall not be permitted to wear respirators when facial hair is present in the seal area or a seal cannot be achieved for any reason.

7.5 RESPONSIBILITIES

7.5.1 Department/Project and Division Heads are responsible for ensuring implementation of this section.

7.5.2 Line Supervisors are responsible for:

- A. Ensuring that a Job Hazard Analysis (JHA) to identify potentially hazardous conditions is completed in cooperation with Industrial Hygiene (IH) to assess the need for respirators as required in PPPL Procedure ESH-004.
- B. Identifying those employees who may need to wear respirators.
- C. Ensuring that such employees achieve and maintain respirator-qualified status.
- D. Arranging for the procurement of prescription lens inserts for use in full-facepiece respirators by employees who require corrective lenses. Such equipment shall be provided at no cost to employees.
- E. Enforcing the use of respirators when respiratory protection is needed.
- F. Ensuring that respirators are used in accordance with instructions and training provided by IH.
- G. Monitoring the work area during respirator use for the occurrence of adverse conditions and worker stress.

- H. Informing IH of observed or suspected respirator malfunctions.
- I. Requesting the issue of respirators maintained by the IH. The names of employees requiring respirators and the nature of the activity shall be provided to IH at least 48 hours in advance of the operation if possible.
- J. Expeditiously returning borrowed respirators when work is completed.
- K. Establishing written standard operating procedures for respirators maintained by the supervisor's group. The procedures must, at a minimum, address the following areas:
 - 1. Authorized uses and limitations
 - 2. Maintenance, inspection, storage, and disinfection
 - 3. Recordkeeping requirements
- L. Obtaining IH review and approval of procedures required in paragraph K, above.
- M. Acting as or appointing a respirator control officer for group maintained respirators.

7.5.3 Industrial Hygiene (IH) shall be responsible for:

- A. Assisting Line Supervisors in identifying atmospheric hazards in their workplace which could require the use of respirators
- B. Consulting with Health Physics for determining respiratory protection requirements for airborne radiological hazards.
- C. Selection of respirators, cartridges, and related equipment for the control of specific exposures. Only NIOSH approved respiratory protection shall be used (excepting "Bubble Suits" for which there is no NIOSH approval)
- D. Training employees and supervisors in the proper use of respirators available through IH. For other respirators, IH will coordinate with supervisors of such respirator wearers to ensure adequate training is provided and participate in such training as appropriate (for example: SCBA training).
- E. Fit testing of respirators and employees who require such testing in accordance with OSHA standard, 29 CFR 1910.134 Appendix A and IH-OP-11. Records of the fit tests shall include: the name of the employee, the type of fit test provided, the specific model and size of respirator tested, the date of the test, and the fit factor achieved. IH will forward a copy of the fit test record to Human Resources and will maintain a copy until the next fit test is administered.

- F. Coordination with the Occupational Medicine Office (OMO) to ensure that respirator wearers are medically qualified to wear such respirators before they are fit tested and permitted to wear respirators. IH shall also provide information regarding the use of the respirator, if available, to the OMO prior to the physical, including:
1. the type and weight of the respirator,
 2. the duration and frequency of use,
 3. the expected physical work effort,
 4. additional protective clothing and equipment to be worn,
 5. and the temperature and humidity extremes that may be encountered.
- G. Issuance of respirators for non-routine operations. Respirators and cartridges shall be selected on a job-by-job basis after a review of the operation and associated hazards. IH shall maintain an inventory of respirators suitable for activities at PPPL in a range of sizes and brands so as to facilitate achieving a satisfactory fit by as many employees as possible.
- H. Monitoring respirator use for non-emergency operations and the level of respiratory hazard during such operations.
- I. Inspection, maintenance, cleaning, disinfection, and storage of respirators issued by IH, including cleaning and disinfecting respirators used for training or fit testing prior to reuse.
- J. Determining the End of Service Life for cartridges either through use of End of Service Life Indicators (ESLI) or through an appropriate change-out schedule based upon best available objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. This data will include any previous monitoring results and any information provided through the manufacturer or other testing service. The change out schedule will be documented for each activity requiring respiratory protection cartridges.
- K. Maintenance of all records pertaining to IH maintained respirators, along with relevant air monitoring data.
- L. Approval of standard operating procedures established by supervisors for respirators they maintain.
- M. Verification of effective inspection, cleaning, and disinfection of respirators maintained by Line Supervisors.
- N. Administering this Respiratory Program and updating it to reflect any changes in the workplace use of respirators.
- O. Ensuring that respirators, training and medical evaluations are provided with no cost to the employee.

- P. Providing a Powered Air Purifying Respirator (PAPR) if the medical evaluation shows the need.

7.5.4 The Occupational Medicine Office (OMO) is responsible for:

- A. Providing a medical evaluation to determine the employee's ability to use a respirator, prior to fit testing or use of a respirator.
- B. Maintaining certification as a Physician or other Licensed Health Care Professional (PLHCP) in order to legally provide the required medical evaluation.
- C. Ensuring that the medical evaluation includes all information requested in OSHA 29CFR 1910.134 Appendix C.
- D. Providing the physical examination(s) at no cost to the employee and during the employee's normal work hours or at a time and place convenient to the employee.
- E. Providing a follow-up medical examination if the initial examination or questionnaire shows a need. The follow-up exam shall include any medical tests, consultations, or diagnostic procedures that the PLHCP deems necessary.
- F. Being available to discuss the evaluation with the employee.
- G. Providing a written recommendation to the user, IH, the Line Supervisor, and Human Resources and Training regarding the employee's ability to wear a respirator, any limitations to be imposed on the user, any need for a follow-up medical evaluation, and affirmation that the user has received a copy of the recommendation.
- H. Providing an additional medical evaluation if
 1. An employee reports medical signs or symptoms that are related to their ability to use a respirator;
 2. A PLHCP, supervisor, or IH informs the OMO that an employee needs to be reevaluated;
 3. Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or
 4. A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

7.5.5 Employees are responsible for:

- A. Not wearing any respiratory protection unless they have a current medical evaluation, a current fit test on the model of respirator to be worn, and current training qualification.

- B. Wearing and using respirators issued to them in accordance with instructions and training provided by the IH and supervisors.
- C. Not wearing a tight-fitting facepiece if facial hair comes between the face and the sealing surface of the respirator.
- D. Performing a user seal check each time they put on a respirator.
- E. Informing their supervisors or IH of any working conditions for which they feel a respirator is needed or wanted.
- F. Cleaning and disinfecting their respirator as often as necessary to maintain a sanitary condition. Respirators shall be cleaned and disinfected before being given to another employee.
- G. Storing respirators to prevent damage, in a clean, protected location.
- H. Inspecting their respirator prior to each use and during cleaning. Inspection shall include: 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; and a check of elastomeric parts for pliability and signs of deterioration.
- I. Returning any respirator that fails inspection to IH for repair or disposal.
- J. Informing Occupational Medicine of any personal health problems that could be aggravated by the wearing of a respirator or could make wearing of a respirator inadvisable.
- K. Reporting any ill-fitting or malfunctioning respirators to their supervisor or IH.
- L. Leaving the area of exposure to wash their faces and respirators to avoid irritation if necessary, or if they detect vapor breakthrough, changes in breathing resistance, or leakage of the facepiece.

7.6 TRAINING

7.6.1 Training for respiratory protection shall include the following:

- A. Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.
- B. What the limitations and capabilities of the respirator are.
- C. How to inspect, put on and remove, use and check the seals of the respirator.
- D. What the procedures are for the maintenance and storage of the respirator.

7.6.2 Retraining shall be administered annually, any respirator user must have been trained within the past 12 months.

7.6.3 Retraining shall be required if any of the following situations occur:

- A. Changes in the workplace or type of respirator
- B. Demonstrated inadequacies in the employee's knowledge or use of the respirator.

7.7 VOLUNTARY USE OF RESPIRATORS

7.7.1 Respirators may be provided at the request of employees, or employees may be permitted to use their own respirators if the respirator use itself will not create a hazard.

7.7.2 Voluntary users of respirators are to be provided with and shall be required to read Appendix A of this Chapter. Human Resources shall document the reading of the Appendix as a training course.

7.7.3 Voluntary users must participate in the medical evaluation as required in this Chapter, and shall be trained in proper cleaning, storage and maintenance of the respirator.

7.7.4 Voluntary users of filtering facepieces (dust masks) are exempt from training and medical evaluation, but must still be provided with Appendix A for their information.

WARNING: Disposable dust respirators provide no protection against gases or vapors and provide inadequate protection against welding fumes, asbestos, and other highly toxic dusts.

7.8 ATMOSPHERE SUPPLYING RESPIRATORS

7.8.1 Only a full facepiece pressure demand self-contained breathing apparatus (SCBA) or supplied-air respirator (SAR) with an auxiliary self-contained air supply are permitted in potentially Immediately Dangerous to Life and Health (IDLH) or oxygen deficient situations.

7.8.2 All employees wearing tight-fitting facepiece respirators must pass the Fit Test, even if the respirator is to be used under positive pressure. Fit testing will be done in a negative pressure mode.

7.8.3 Quantitative Fit Testing must be used to test respirators to be worn in IDLH situations.

7.8.4 For IDLH or possible IDLH atmospheres, the following apply:

- A. One employee, or, when needed, more than one employee must be located outside the IDLH atmosphere.
- B. Visual, voice or signal line communication must be maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere.
- C. The employee(s) located outside the IDLH atmosphere must be trained and equipped to provide effective emergency rescue.

- D. Prior to performing rescue, the outside employee shall inform the Incident Commander of the rescue.
- E. The Incident Commander must provide necessary assistance, including calling for mutual aid if appropriate.
- F. The employee(s) designated to perform rescues shall be equipped with SCBA and retrieval equipment.

7.8.5 For interior structural firefighting, the following rules also apply:

- A. A minimum of two employees must enter the IDLH atmosphere and remain in contact at all times.
- B. At least two employees must be stationed outside the IDLH atmosphere.
- C. All employees involved in the firefighting shall use SCBAs

NOTE: This does not preclude emergency rescues prior to assembly of the full team.

7.8.6 Respirators to be used in an emergency shall be inspected at least monthly and in accordance with all manufacturer's recommendations, and shall be checked for proper function after each use.

7.8.7 Respirators for emergency use shall be certified by documenting the date of inspection, the name or signature of the inspector, the findings, required remedial action taken(?) and a serial number. This information shall be maintained until a subsequent inspection.

7.8.8 Supplied air respirators shall only use Grade D or better breathing air.

7.8.9 Breathing air cylinders shall be tested in accordance with Department of Transportation (DOT) requirements.

7.9 REFERENCES

7.9.1 29 CFR 1910.134 - OSHA Respiratory Protection Standard for General Industry

7.9.2 American National Standards Institute (ANSI) Z88.2-1992, "Respiratory Protection"

Appendix A

Information for Voluntary Use of Respirators by Employees

* Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may

wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If you voluntarily wish to wear a respirator not required by IH or the hazards of your work, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

* You must do the following:

* 1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.

* 2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you. Consult with IH to determine the appropriate respirator and cartridge for your concern.

* 3. Do not wear your respirator into atmospheres containing contaminants for which it does not provide protection. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.

* 4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.