Chapter 29

Respiratory Protection

1 Purpose

The purpose of this program is to protect workers against injury and illness caused by respirable hazards. It covers authorizing workers to use a respirator (including evaluating need for a respirator; selecting the appropriate respirator type and cartridge type and change schedule; medically evaluating and training workers; and fit testing) and the use, inspection, maintenance, and storage of respirators and dust masks. It applies to workers, supervisors, ESH coordinators, the Occupational Health Center, and the respiratory protection program manager.

2 Roles and Responsibilities

Functional roles and general responsibilities for each are listed below. More detailed responsibilities and when they apply are provided in the procedures and requirements.

The roles may be performed by one or more individuals and one individual may play more than one role, depending on the structure of the organizations involved. Responsibilities may be delegated.

2.1 Worker

- Uses respirators only when authorized, for the reviewed processes and operations, and then only after completing required initial training, medical evaluation, and practical fit testing (see Respiratory Protection: Evaluation and Certification Procedure)
- Does not share respirators with others
- Renews authorization to use a respirator, including medical evaluation, training, and fit testing, each year
- Maintains a clean-shaven face where the respirator face piece seals effectively against the skin
- Reports to supervisor immediately any difficulty in or resulting from respirator use
- Reports to supervisor immediately any physical changes that may reduce the effectiveness of the face seal (such as weight loss or gain of 20 or more pounds, scarring, dental changes such as multiple extractions without prosthesis or dentures, or cosmetic surgery)
- Follows all requirements for using, inspecting, maintaining, and storing respirators (see Respiratory Protection: Use, Inspection, Maintenance, and Storage Requirements)
Chapter 29: Respiratory Protection

Quick Start Summary

Product ID: 655 | Revision ID: 2177 | Date published: 10 March 2020 | Date effective: 10 March 2020
URL: https://www-group.slac.stanford.edu/esh/eshmanual/references/respiratorQuickstart.pdf

1 Who needs to know about these requirements

The requirements of Respiratory Protection apply to workers, supervisors, ESH coordinators, and the Occupational Health Center. They cover authorizing workers to use a respirator (including evaluating need for a respirator; selecting the appropriate respirator type and cartridge type and changeout schedule; medically evaluating and training workers; and fit testing) and the use, inspection, maintenance, and storage of respirators and dust masks.

2 Why

In certain work environments harmful dusts, mists, fumes, gases, vapors, or radioactive or toxic particles cannot be adequately removed from the air so respiratory protection must be used.

3 What do I need to know

Only workers who have been authorized to do so may use respirators. The authorization process involves approval by the supervisor and ESH coordinator; training; medical evaluation, and fit testing. The authorization process must be completed before a respirator is worn and must be renewed every year.

Respirators must be used, inspected, stored, and maintained according to the requirements of this program. Workers are to use only the respirators they have been issued and only for the processes and operations that have been reviewed.

Workers who are not authorized to use respirators may elect to use dust masks, following the requirements of this program.

4 When

These requirements take effect 10 March 2020.

5 Where do I find more information

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)
- Chapter 29, “Respiratory Protection”

Or contact the program manager.
If voluntarily wearing a dust mask (where respiratory protection is not required or authorized), follows all requirements for using and storing dust masks, including becoming familiar with and following the guidance of 8 CCR 5144 Appendix D

2.2 Supervisor

- Ensures work area has been evaluated as needed to identify any respiratory hazards
- Contacts ESH coordinator when there is any change in production, process, or equipment that may generate or increase contaminant levels and therefore respiratory protection requirements
- Authorizes workers to use respirators, including ensuring required training, medical evaluation, and fit testing is completed before use and renewed each year
- Removes workers from program if respirator no longer needed
- Ensures that workers denied authorization to wear respirators do not use them
- Ensures that workers wear respirators during operations requiring respiratory protection
- Ensures that workers use, inspect, maintain, and store their respirators properly
- Refers immediately workers who experience difficulty in respirator use to the Occupational Health Center for medical reevaluation before allowing further respirator use
- Ensures that workers who voluntarily wear a dust mask (where respiratory protection is not required or authorized) follow all requirements for using and storing dust masks

2.3 ESH Coordinator

- Evaluates and designates operations where respirators are required, seeking assistance from an appropriately trained person. Respirators are required when an occupational exposure limit (OEL) is or could be exceeded.
- Recommends respirator and cartridge types according to the identified or anticipated respiratory hazard
- Recommends protective measures to minimize exposure of workers to respiratory hazards
- Reviews plans for new operations and significant changes to ongoing operations as needed to control respiratory hazards

2.4 Occupational Health Center

- Conducts required respiratory medical evaluation (including medical questionnaire, exam, and spirometry test); documents any restrictions on use
- Conducts practical training and fit tests for respirator wearer certification
- Maintains fit testing equipment properly
- Maintains fit test results and respirator user forms
- Maintains medical records for the duration of the affected worker’s employment plus 30 years
2.5 Respiratory Protection Program Manager

- Maintains equipment calibration logs

3 Procedures, Processes, and Requirements

These documents list the core requirements for this program and describe how to implement them:

- **Respiratory Protection: Evaluation and Certification Procedure** (SLAC-I-730-0A09C-004). Describes process for evaluating the need for respirators, selecting the appropriate respirator and cartridge type and changeout schedule, fit testing, and medically evaluating and training workers

- **Respiratory Protection: Use, Inspection, Maintenance, and Storage Requirements** (SLAC-I-730-0A09S-032). Describes requirements for using, inspecting, maintaining, and storing respirators and dust masks

These documents provide useful guidance; their use is not mandatory:

- None

4 Training

4.1 Worker

The following courses are required for workers wearing a respirator:

- ESH Course 241, Respiratory Protection Training ([ESH Course 241](#)) (annually)
- ESH Course 241ME, Respirator Safety Medical Exam ([ESH Course 241ME](#)) (annually)
- ESH Course 241PRA, Respirator Fit Test ([ESH Course 241PRA](#)) (annually)

The courses must be completed before a respirator is used.

ESH Course 241, Respiratory Protection Training ([ESH Course 241](#)), is recommended for supervisors of workers who wear respirators.

4.2 Dust Mask Users

Workers who elect to wear a dust mask for comfort (where respiratory protection is not required or authorized) may take the respirator safety training course ([ESH Course 241](#)) but will not undergo a medical evaluation, spirometry test, or practical fit test unless required for other respirator use.

Voluntary dust mask users must become familiar with and follow the guidance of [8 CCR 5144 Appendix D](#), “Information for Employees Using Respirators When Not Required Under the Standard”, before wearing a dust mask.
4.3 Workers Exposed to Wildfire Smoke

Workers who work outside for one hour or more during a wildfire smoke event with an air quality index greater than 150 are required to take the following course:

- ESH Course 193, Wildfire Smoke Protection Training (ESH Course 193)

5 Definitions

*atmosphere, hazardous.* An atmosphere that is *oxygen deficient* or contains a toxic contaminant exceeding the *occupational exposure limit*

*atmosphere, 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

*atmosphere, oxygen deficient.* An atmosphere containing less than 19.5 percent oxygen by volume

*air-purifying cartridge.* A container with a filter, sorbent, or catalyst, or any combination thereof, which removes specific contaminants from the air drawn through it

*contaminant.* A harmful, irritating, or nuisance material that is foreign to the normal atmosphere

*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. This does not include single strap comfort masks or surgical masks, which do not create a negative pressure seal against the skin of the face.

*facepiece.* That portion of a respirator that covers the wearer’s nose and mouth

*fit test.* The use of a protocol to evaluate qualitatively or quantitatively the fit of a respirator on an individual

- *fit test, qualitative.* A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual’s response to the test agent
- *fit test, quantitative.* An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator

*limit, occupational exposure (OEL).* An exposure limit that is the lower of the *permissible exposure limit* or *threshold limit value* (see also *permissible exposure limit* and *threshold limit value*)

*limit, permissible exposure (PEL).* An exposure limit published and enforced by the federal Occupational Health and Safety Administration (OSHA) as a legal standard. A PEL may be either a time-weighted-average (TWA) exposure limit (eight hour), a 15-minute short-term exposure limit (STEL), or a ceiling (C) and may have a skin designation.

*respiratory protection.* The process of using a respirator properly to prevent harmful inhalable substances from entering the lungs

*respirable.* Able to be breathed. Also refers to particle size diameter less than or equal to 10 micrometers
respirator. A device designed to protect the wearer from the inhalation of hazardous atmospheres. This does not include single strap comfort masks or surgical masks which do not create a negative pressure seal against the skin of the face.

- **respirator, air-purifying (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

- **respirator, negative pressure (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

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

**spirometry.** A basic pulmonary function test that measures how much and how fast air moves out of the lungs

**threshold limit value (TLV).** Recommended guidelines for occupational exposure to airborne contaminants published by the American Conference of Governmental Industrial Hygienists (ACGIH). TLVs represent the average concentration for an eight-hour workday and a 40-hour workweek to which nearly all workers may be repeatedly exposed without adverse effect.

6 References

6.1 External Requirements

The following are the external requirements that apply to this program:


  - Appendix A, “Fit Testing Procedures” (*8 CCR 5144 Appendix A*)
  - Appendix B, “User Seal Check Procedures” (*8 CCR 5144 Appendix B*)
  - Appendix C, “OSHA Respirator Medical Evaluation Questionnaire” (*8 CCR 5144 Appendix C*)
  - Appendix D, “Information for Employees Using Respirators When Not Required Under the Standard” (*8 CCR 5144 Appendix D*)

- American Conference of Governmental Industrial Hygienists (ACGIH). Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) (2016) (*ACGIH TLVs and BEIs-2016*)


6.2 Related Documents

[SLAC Environment, Safety, and Health Manual](SLAC-I-720-0A29Z-001) (SLAC-I-720-0A29Z-001)

- Chapter 19, “Personal Protective Equipment”
Other SLAC Documents

- SLAC Occupational Health Center

Other Documents

Chapter 29: Respiratory Protection

Evaluation and Certification Procedure

1 Purpose

The purpose of this procedure is to ensure that respirators are used appropriately and safely. It covers evaluating a worker’s need for a respirator; selecting the appropriate respirator type and cartridge type and changeout schedule; medically evaluating and training workers; and fit testing. It applies to workers, supervisors, ESH coordinators, the Occupational Health Center, and the respiratory protection program manager.

2 Procedure

This procedure is to be performed when

1. Adding a worker to the respiratory protection program (deciding for the first time a worker needs a respirator)
2. Renewing a worker (updating training, fit testing, and medical evaluation, required every year)
3. Removing a worker from the program (deciding a worker no longer needs a respirator)

<table>
<thead>
<tr>
<th>Step</th>
<th>Person</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Worker</td>
<td>Completes the requester section of the Respiratory Protection: Respirator User Form, describing need (or not) for a respirator, and submits form to supervisor</td>
</tr>
<tr>
<td>2.</td>
<td>Supervisor</td>
<td>Reviews need for a respirator; completes supervisor section and submits form to the ESH coordinator</td>
</tr>
</tbody>
</table>
| 3.   | ESH coordinator | Reviews need for a respirator, based on  
  - Worker justification  
  - Knowledge of operations  
  - Existing or new industrial hygiene survey (see Industrial Hygiene and the Industrial Hygiene Document Database)  
  Completes authorization section; if a respirator is justified recommends model and cartridge type  
  Respirators are required when an occupational exposure limit (OEL) is or could be exceeded  
  Returns form to supervisor |
| 4.   | Supervisor   | If adding (or renewing) a worker, enters (or confirms) the following courses in the |
### Step 2.1 Additional Requirements

#### 2.1.1 Fit Testing

In addition to initial and annual tests, a fit test must be administered whenever an individual selects a different respirator or when changes occur to the person’s physical condition that could prevent an effective face seal. Such conditions include facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight (a guideline is the loss or gain of 20 pounds).
2.1.2 Medical Reevaluation

Supervisors must immediately refer workers who experience difficulty in respirator use to the Occupational Health Center for medical reevaluation before allowing further respirator use. Conditions that would indicate a need for reevaluation include the following:

- Worker has difficulty breathing, shortness of breath, dizziness, or a severe psychological reaction during respirator use or any phase of fit testing.
- Worker reports signs or symptoms that are related to respirator use.
- Any change in individual exposure or stress, physical difficulty in respirator use, or change in work conditions such as physical work effort, protective clothing, or temperature.

2.1.3 Voluntary Respirator and Dust Mask Use

2.1.3.1 Voluntary Respirator Use

Workers who wish to wear a respirator voluntarily, when a survey or other determination has shown that a respirator is not required, must follow the procedure above and must meet all requirements of this program.

2.1.3.2 Voluntary Dust Mask Use

When a respirator is not required, an individual may choose to use a dust mask instead for comfort. Dust mask users may elect to take the respirator safety training course (ESH Course 241) but will not undergo a medical evaluation, spirometry test, or practical fit test unless required for other respirator use. There is no formal approval process for wearing a dust mask.

Voluntary dust mask users must become familiar with and follow the guidance of 8 CCR 5144 Appendix D, “Information for Employees Using Respirators When Not Required Under the Standard”, before wearing a dust mask.

If voluntary dust mask use is elected, SLAC will provide the wearer with a National Institute of Occupational Safety and Health (NIOSH) approved dust mask.

Warning Dust masks are not to be worn as protection against harmful gases or vapor, toxic contaminants, high concentrations of contaminants (such as those released during sandblasting) or in atmospheres that are immediately dangerous to life or health (IDLH) or oxygen deficient.

3 Forms

The following forms are required by this procedure:

- Respiratory Protection: Respirator User Form (SLAC-I-730-0A09J-010). Form for documenting authorization to use a respirator and completion of required training, medical evaluation, and fit testing.

4 Recordkeeping

The following recordkeeping requirements apply for this procedure:
The Occupational Health Center maintains
- Completed respirator user forms
- Respirator fit test results until the next fit test for the subject worker
- Medical history questionnaire forms and medical exam records for the duration of the affected worker’s employment plus 30 years

5 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)
- Chapter 29, “Respiratory Protection”
  - Respiratory Protection: Use, Inspection, Maintenance, and Storage Requirements (SLAC-I-730-0A09S-032)

Other SLAC Documents
- Industrial Hygiene
  - Industrial Hygiene Document Database
- ESH Course 241, Respiratory Protection Training (ESH Course 241)
- ESH Course 241ME, Respirator Safety Medical Exam (ESH Course 241ME)
- ESH Course 241PRA, Respirator Fit Test (ESH Course 241PRA)
- SLAC Training Assessment (STA)
- SLAC Occupational Health Center

Other Documents
  - Appendix A, “Fit Testing Procedures” (8 CCR 5144 Appendix A)
  - Appendix B, “User Seal Check Procedures” (8 CCR 5144 Appendix B)
  - Appendix C, “OSHA Respirator Medical Evaluation Questionnaire” (8 CCR 5144 Appendix C)
  - Appendix D, “Information for Employees Using Respirators When Not Required Under the Standard” (8 CCR 5144 Appendix D)
Respirator User Form

This form is for documenting authorization to use a respirator and completion of required training, medical evaluation, and fit testing. It is to be completed before a worker may use a respirator for the first time, annually thereafter, and when a respirator is no longer needed. See Respiratory Protection: Evaluation and Certification Procedure (SLAC-I-730-0A09C-004). The Occupational Health Center maintains completed forms.

Requester Information

<table>
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<tr>
<th>Respirator needed?</th>
<th>Yes ☐ No ☐</th>
<th>Why?</th>
<th>Name (print)</th>
<th>Signature</th>
<th>Date</th>
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</table>

Supervisor Authorization

<table>
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<th>Respirator needed?</th>
<th>Yes ☐ No ☐</th>
<th>Comments</th>
<th>Name (print)</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

Respiratory Protection Recommendations and Authorization (to be completed by ESH coordinator)

<table>
<thead>
<tr>
<th>Respirator needed?</th>
<th>Yes ☐ No ☐</th>
<th>Why?</th>
<th>Respirator type</th>
<th>Half mask:</th>
<th>Full face:</th>
<th>Other:</th>
<th>Manufacturer</th>
<th>Size</th>
<th>Model</th>
<th>Cartridge type</th>
<th>Filter type</th>
<th>Changeout schedule</th>
<th>Name (print)</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

Respiratory Safety Training Completion (ESH Course 241) (to be completed by requester)

| Date training completed | |
|-------------------------| |

Medical Clearance (ESH Course 241ME) (to be completed by Occupational Health Center staff)

<table>
<thead>
<tr>
<th>Medically qualified to wear respirator? Yes ☐ No ☐</th>
<th>Restrictions on use? Yes ☐ No ☐</th>
<th>Name (print)</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

Describe any restrictions

<table>
<thead>
<tr>
<th>Name (print)</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

Practical Training and Fit Test (ESH Course 241PRA) (to be completed by Occupational Health Center staff)

<table>
<thead>
<tr>
<th>Training completed? Yes ☐ No ☐</th>
<th>Fit test completed? Yes ☐ No ☐</th>
<th>Fit test type</th>
<th>QNFT ☐ QLFT ☐</th>
<th>Fit factor</th>
<th>Name (print)</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

Chapter 29: Respiratory Protection

Use, Inspection, Maintenance, and Storage Requirements

1 Purpose

The purpose of these requirements is to ensure the safe use of respirators and dust masks. They cover use, inspection, maintenance, and storage. They apply to workers and supervisors.

2 Requirements

2.1 Use

Respirators are issued to individual workers for protection against airborne contaminant(s), only after authorization and completion of required respiratory medical evaluation, training, and a practical fit test. Respirators must not be worn for any other purpose without the knowledge and approval of the supervisor and the ESH coordinator. Authorization to use a respirator, including medical evaluation, training, and fit testing, must be renewed each year. Changes in respirator used, work conditions, or the worker’s physical condition may require repeating some of the authorization process. (See Respiratory Protection: Evaluation and Certification Procedure.)

2.2 Inspection

Workers must inspect their respirators before and after use. Respirator inspections must include checking that

1. Sealing surface are clean and free of cracks and holes
2. Rubber and elastic parts have good pliability and no signs of deterioration
3. Inhalation and exhalation valves are clean and seated properly
4. Straps are sufficiently elastic and free of worn areas
5. If full face, face shield is cleaned and clear (no smudges, scratches, or other damage that may impede visibility)

Respirators that fail an inspection must be removed from service and replaced.
2.2.1 Pre-use Face Seal Check

Before using a respirator, the wearer must perform a positive and negative pressure check. The wearer must ensure current facial condition will allow an effective seal (for example the wearer must be clean shaven).

1. **Positive pressure check.** Close off exhalation valve with palms and exhale gently. No leakage outward around the seal should occur.

2. **Negative pressure check.** Close off cartridges and inhale. The respirator should collapse slightly on the face. No leakage around the face seal should occur while maintaining a negative pressure inside the respirator for several seconds.

2.3 Maintenance

2.3.1 Cleaning

Respirators must be cleaned and disinfected after each use as follows:

1. Remove filters or cartridges.

2. Disassemble and wash with mild dishwashing detergent in warm water, using a soft brush.

3. Thoroughly rinse to remove any detergent residue.

4. When the cleaner used does not contain a disinfecting agent, respirator components must be immersed for two minutes in a sodium hypochlorite (1 oz [30 ML] household bleach in 2 gallons [7.5L] of water) solution, or other disinfectant. The solution used to clean the respirator(s) should contain some type of biocide for disinfection. Rinse in fresh, warm water.

5. Air dry in a clean place.

**Caution** Do not use organic solvents to clean a respirator or high heat to dry it, as this may damage the elastomeric face piece.

**Note** Commercial respirator cleaning wipes are an acceptable alternative to this cleaning process.

2.3.2 Cartridges and Filters

1. Change cartridges and filters according to the specific schedule provided with the authorization, or sooner if you experience an increased resistance in breathing or when you detect contaminant odors or taste while wearing your respirator.

2. General guidance for organic vapor cartridges. Workers who use respirators intermittently and perhaps in different environments should never reuse organic vapor cartridges after one shift. This is due to chemical desorption of the vapors/gases and their migration through the cartridge charcoal bed. When this occurs, contaminants could be inhaled by the respirator wearer upon initial donning and the concentration could even be higher than contaminant concentrations found in the ambient workplace atmosphere.
2.3.3 Replacement and Repair

Repair of respirators may be done only by experienced personnel with parts designed for the specific respirator needing repair. No attempt may be made to replace parts or to make adjustments or repairs beyond the manufacturer’s recommendations.

2.4 Storage

1. Store respirators away from dust, sunlight, heat, extreme cold, excessive moisture, damaging chemicals, or contamination.
2. Filters and cartridges must be removed from the respirator and stored in separate bags to prevent cross contamination.
3. Do not store items on top of respirators, which could deform the face piece shape.
4. Do not store respirators in such places as lockers or tool boxes unless they are on a separate shelf or in carrying cases or cartons to preserve face piece shape.
5. Respirators must be packed and stored according to the manufacturer’s instructions.
6. Never store a respirator within a fume hood or at a work bench where contaminants are present.

2.5 Maintenance and Care of Dust Masks

Dust masks must be maintained in a clean and sanitary condition. Personnel who wear dust masks must

1. Store dust masks in a plastic bag or box in a secure location such as a locker or desk drawer, away from moisture and contamination.
2. Not share dust masks with others.
3. Not use a dust mask that is torn, distorted, or dirty.

3 Forms

The following are forms required by these requirements:

- None

4 Recordkeeping

The following recordkeeping requirements apply for these requirements:

- None

5 References

SLAC Environment, Safety, and Health Manual (SLAC-I-720-0A29Z-001)
Chapter 29, “Respiratory Protection”
  – Respiratory Protection: Evaluation and Certification Procedure (SLAC-I-730-0A09C-004)