Respirator Protection for the Spray Foam Industry

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OSHA’s
Respiratory Protection Standard
29 CFR 1910.134

NOTE: Employers in states with state plan OSHA programs need to comply with the individual state’s regulations.
Organization of Standard

(a) Permissible practice
(b) Definitions
(c) Respirator program
(d) Selection of respirators
(e) Medical evaluation
(f) Fit testing
(g) Use of respirators
(h) Maintenance and care
(i) Breathing air quality and use
(j) Identification of filters, cartridges, and canisters
(k) Training and information
(l) Program evaluation
(m) Recordkeeping
(n) Dates
(o) Appendices (mandatory)
   A: Fit Testing Procedures
   B-1: User Seal Checks
   B-2: Cleaning Procedures
   C: Medical Questionnaire
   D: Information for Employees Wearing Respirators When Not Required Under the Standard
Exposure Controls

➢ The primary means to prevent breathing contaminated air is through the use of feasible engineering controls:
   ✗ enclosures, confinement of operations, ventilation, or substitution of less toxic materials
➢ When engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used
➢ Employer shall provide respirators which are suitable for the purpose intended
➢ Employer shall be responsible for establishment and maintenance of a respirator program
Employee Exposure

Exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection.
Exposure Concerns in the Spray Foam Industry

ги MDI - Methylene diphenyl diisocyanate
ги MDI is the least hazardous of the commonly available isocyanates.
ги It has a very low vapor pressure. This reduces its hazards during handling compared to the other major isocyanates (TDI, HDI).
ги However, it, like the other isocyanates, is an allergen and sensitizer.

👤 Persons developing sensitivity to isocyanates may have dangerous systemic reactions to extremely small exposures, including respiratory failure.

ги MDI should be not be heated or sprayed except with strict engineering controls and personal protective equipment.
ги It has low human toxicity.
Industrial Hygiene Monitoring

- Review MSDS for hazardous chemicals
- Why monitor?
  - Determine compliance with regulations
    - TWA, STEL, Ceiling
  - Determine controls needed
    - Engineering
    - Administrative
    - PPE
What to Monitor?

- Particulate
  - Dusts and fibers
  - Respirable/non-respirable
- Metals
  - Dust and fumes
- Gases and vapors
Where to Sample?

- Area versus personal sampling.
- Personal air samples should be collected at the employee’s breathing zone.
  - Representative of the employee’s actual exposure.
- If area samples are collected, how well does it represent the actual employee exposure?
Air Sampling Results

- Receive results from lab
- Calculate PEL-TWA
- Compare results with regulatory standards
  - If overexposure, OSHA requires controls to be implemented (in this order):
    1. Engineering
    2. Administrative
    3. PPE
Protection: Two Main Types of Respirators

- Air Purifying (APR)
- Air Supplying (SAR)

- Can be tight or loose fitting
Tight-Fitting

Full Facepiece

Half Mask
<table>
<thead>
<tr>
<th>Hood</th>
<th>Helmet</th>
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</thead>
<tbody>
<tr>
<td>Loose-Fitting Facepiece</td>
<td>Full Body Suit</td>
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</table>
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.
Filter

A component used in respirators to remove solid or liquid aerosols from the inspired air. Also called air purifying element.
Canister or Cartridge

A container with a filter, sorbent, catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.
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.
Negative Pressure Respirator

A respirator in which the air pressure inside the facepiece is **negative during inhalation** with respect to the ambient air pressure outside the respirator.
Positive Pressure Respirator

A respirator in which the pressure inside the respirator exceeds the ambient air pressure outside the respirator.
Powered Air-Purifying Respirator (PAPR)

An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.
Warning Properties of MDI

Many chemicals have warning properties such as odor. MDI has poor warning properties (odorless), though the foam compound may have other ingredients that have good warning properties. Because of MDI’s poor warning properties, use of APR is not permitted; SARs are required.
Air-Supplying Respirator

- A respirator that supplies the user with breathing air from a source independent of the ambient atmosphere
- Includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units
Classes of Atmosphere-Supplying Respirators

- **Continuous Flow.** Provides a continuous flow of breathing air to the respiratory inlet covering
- **Demand.** Admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation
- **Pressure Demand.** Admits breathing air to the facepiece when the positive pressure inside the facepiece is reduced by inhalation
Supplied Air Respirator (SAR)

An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user. Also called **airline respirator**. Limited by hose length.
Self-Contained Breathing Apparatus (SCBA)

An atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user. Limited by size of tank and the employee workload.
Breathing Air Quality and Use

Compressed breathing air must meet at least the requirements for Type 1 - Grade D breathing air described in ANSI/CGA G-7.1-1989:

- Oxygen content of 19.5 - 23.5%
- Hydrocarbon content of 5 mg/m³ (milligrams per cubic meter) of air or less
- CO content of 10 parts per million (ppm) or less
- CO₂ content of 1,000 ppm or less
- Lack of noticeable odor
Respirator Program

- Must develop a **written program** with **worksite-specific procedures** when respirators are required by the employer.
- Must update program to reflect changes in workplace conditions that affect respirator use.
- Must designate a **program administrator** who is qualified by appropriate training or experience to administer or oversee the program.
- Must provide respirators, training, and medical evaluations at no cost to the employee.

**Note:** OSHA has prepared a *Small Entity Compliance Guide* that contains criteria for selection of a program administrator and a sample program.
Respirator Program Elements

1. Selection
2. Medical evaluation
3. Fit testing
4. Use
5. Maintenance and care
6. Breathing air quality and use
7. Training
8. Program evaluation
Selection of Respirators

Employer must select and provide an appropriate respirator based on the respiratory hazards to which the worker is exposed and workplace and user factors that affect respirator performance and reliability.
Selection of Respirators (cont’d)

ёт Select a NIOSH-certified respirator that shall be used in compliance with the conditions of its certification

_identify and evaluate the respiratory hazards in the workplace, including a reasonable estimate of employee exposures and identification of the contaminant’s chemical state and physical form

Where exposure cannot be identified or reasonably estimated, the atmosphere shall be considered Immediately Dangerous to Life or Health (IDLH)

Select respirators from a sufficient number of models and sizes so that the respirator is acceptable to, and correctly fits, the user
Assigned Protection Factor (APF)

The *workplace level* of respiratory protection that a respirator is expected to provide to employees when the employer implements a continuing, effective respiratory protection program as specified in this section.
Assigned Protection Factors (APF’s)

- Must use the APF’s to select a respirator that meets or exceeds the required level of protection.
- When using a combination respirator (e.g., airline with an air-purifying filter), must ensure that the APF is appropriate to the mode of operation in which the respirator is being used.
<table>
<thead>
<tr>
<th>Respirator Type&lt;sup&gt;1, 2&lt;/sup&gt;</th>
<th>Quarter Mask</th>
<th>Half Mask</th>
<th>Full Face</th>
<th>Helmet/Hood</th>
<th>Loose-Fitting</th>
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<tbody>
<tr>
<td>Air Purifying</td>
<td>5</td>
<td>10</td>
<td>50</td>
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<tr>
<td>PAPR</td>
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<td>1,000</td>
<td>25/1,000</td>
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<tr>
<td>SAR</td>
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<td>10</td>
<td>50</td>
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<td><strong>Demand</strong></td>
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<td><strong>Continuous Flow</strong></td>
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<td>1,000</td>
<td>25/1,000</td>
<td>25</td>
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<tr>
<td><strong>Pressure Demand/other (+) pressure</strong></td>
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<td>1,000</td>
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<tr>
<td>SCBA</td>
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<td><strong>Demand</strong></td>
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Maximum Use Concentration (MUC)

- The maximum atmospheric concentration of a hazardous substance from which an employee can be expected to be protected when wearing a respirator

- Determined by the assigned protection factor of the respirator and the exposure limit of the hazardous substance

\[ MUC = APF \times OSHA \text{ Exposure Limit} \]

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1 When no OSHA exposure limit is available for a hazardous substance, the employer must determine an MUC on the basis of relevant available information and informed professional judgment.
Physician or Other Licensed Health Care Professional (PLHCP)

An individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him/her to independently provide, or be delegated the responsibility to provide, some or all of the health care services required by paragraph (e), Medical evaluation.
Medical Evaluation Procedures

- Must provide a medical evaluation to determine employee’s ability to use a respirator, **before fit testing and use**
- Must identify a PLHCP to perform medical evaluations using a medical questionnaire or an initial medical examination that obtains the same information
- Medical evaluation must obtain the information requested by the questionnaire in Sections 1 and 2, Part A of App. C
- Follow-up medical examination is required for an employee who gives a positive response to any question among questions 1 through 8 in Section 2, Part A of App. C or whose initial medical examination demonstrates the need for a follow-up medical examination
Medical Evaluation
Additional Medical Evaluations

- Annual review of medical status is not required
- At a minimum, employer must provide additional medical evaluations if:
  - Employee reports medical signs or symptoms related to the ability to use a respirator
  - PLHCP, supervisor, or program administrator informs the employer that an employee needs to be reevaluated
  - Information from the respirator program, including observations made during fit testing and program evaluation, indicates a need
  - Change occurs in workplace conditions that may substantially increase the physiological burden on an employee
Fit Testing

Before an employee uses any respirator with a negative or positive pressure tight-fitting facepiece, the employee must be fit tested with the same make, model, style, and size of respirator that will be used.
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.
Quantitative Fit Test (QNFT)

An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator (ratio of contaminant inside versus outside the respirator).
Employees using tight-fitting facepiece respirators must pass an appropriate qualitative fit test (QLFT) or quantitative fit test (QNFT):
- prior to initial use,
- whenever a different respirator facepiece (size, style, model or make) is used, and
- at least annually thereafter

Must conduct an additional fit test whenever the employee reports, or the employer or PLHCP makes visual observations of, changes in the employee’s physical condition (e.g., facial scarring, dental changes, cosmetic surgery, or obvious change in body weight) that could affect respirator fit
Use of Respirators
Facepiece Seal Protection

- Respirators with tight-fitting facepieces must not be worn by employees who have facial hair or any condition that interferes with the face-to-facepiece seal or valve function.
- Corrective glasses or goggles or other PPE must be worn in a manner that does not interfere with the face-to-facepiece seal.
- Employees wearing tight-fitting respirators must perform a user seal check **each time they put on the respirator** using the procedures in Appendix B-1 or equally effective manufacturer’s procedures.
User Seal Check

An action conducted by the respirator user to determine if the respirator is properly seated to the face.

Positive Pressure Check

Negative Pressure Check
Training and Information

Employers must provide effective training to employees who are required to use respirators.
Employees who are required to use respirators must be trained such that they can demonstrate knowledge of at least:

- why the respirator is necessary and how improper fit, use, or maintenance can compromise its protective effect
- limitations and capabilities of the respirator
- effective use in emergency situations
- how to inspect, put on and remove, use and check the seals
- maintenance and storage
- recognition of medical signs and symptoms that may limit or prevent effective use
- general requirements of this standard
Training and Information (cont’d)

- Training must be provided prior to use, unless acceptable training has been provided by another employer within the past 12 months.
- Retraining is required annually, and when:
  - changes in the workplace or type of respirator render previous training obsolete.
  - there are inadequacies in the employee’s knowledge or use.
  - any other situation arises in which retraining appears necessary.
- The basic advisory information in Appendix D must be provided to employees who wear respirators when use is not required by this standard or by the employer.
Additional Information at www.osha.gov
Respirator Change-out Schedules
Respiratory Protection
Respiratory Protection eTool
Respiratory Protection (Small Entity Compliance Guide) - (Publications)
Respiratory Protection Standard - Training and Reference Materials
Respiratory Protection Standard, Assigned Protective Factors (APF)
OSHA Consultation Services

OSHA's On-Site Consultation Service offers free and confidential advice to small and medium-sized businesses in all states across the country, with priority given to high-hazard worksites. Consultation services are totally separate from enforcement and do not result in penalties or citations.
Consultation Services

- Free!
- The service is delivered by state governments using well-trained professional staff.
- Most consultations take place on-site.
- Primarily targeted for smaller businesses.
- This safety and health consultation program is completely separate from the OSHA inspection effort.
- It's confidential, too.
  - Your name, your firm's name, and any information you provide about your workplace, plus any unsafe or unhealthful working conditions that the consultant uncovers, will not be reported routinely to the OSHA inspection staff.
OSHA Training Institute (OTI) Education Centers

The OSHA Training Institute provides training and education in occupational safety and health for federal and state compliance officers, state consultants, other federal agency personnel, and the private sector.

Demand was so high that Education Centers were developed for the private sector.

Facilities located nation-wide:
http://www.osha.gov/fso/ote/training/edcenters/index.html