1) PURPOSE
The Eastern Washington University (EWU) Respiratory Protection Program is intended to provide standard operating procedures regarding the use of respirators by employees and to comply with the requirements of WAC 296-842. Respirators are used to protect employees from inhaling hazardous contaminants in the air. These contaminants can be in the form of gases, vapors, mists or dust.

Engineering controls, such as ventilation and substitution of less toxic materials are the first line of defense. However, engineering controls do not always eliminate the hazards, in these situations, respirators and other protective equipment must be used. Respirators are also utilized for protection during emergencies.

The primary purpose of this program is to provide instruction on the selection of appropriate respirators, their use, and how to properly maintain them. Following is a summary of the emphasis of the program:

- How the proper respirator for particular hazards are selected
- When and how respirators will be used in routine work activities, infrequent activities, and foreseeable emergencies
- Medical evaluations for respirator users
- Fitting the respirator to the employee
- The implementation of a respiratory maintenance program
- The required training in the correct use and care of the respirator
- Respirator program evaluation

SCOPE AND APPLICATION
The respiratory program applies to all employees who are required to wear respirators during normal work operations and during certain non-routine or emergency operations. Employees participating in the respirator protection program do so at no cost to them. The expenses associated with medical evaluations, training, and equipment will be borne by EWU.

VOLUNTARY RESPIRATORY USE
Employees who voluntarily choose to use a cartridge style respirator when the respirator is not required are subject to the medical evaluation, cleaning, maintenance and storage elements of this program. These individuals will also receive training covering proper procedures for cleaning, maintenance and storage of their respirators. In addition, the information specified in “Important Information about Voluntary Use of Respirators” will be provided to all voluntary users of respirators.

Employees who voluntarily choose to use a filtering face piece respirator (i.e., a dust mask style respirator) are excluded from all other requirements of this program.

RESPONSIBILITIES
The Environmental Health and Safety (EH&S) Department has overall authority for the Respiratory Protection Program and will act as the program administrator for the respiratory protection program. Each Department and/or Shop Supervisor or their designate will select a department administrator.
The respirator program administrator duties include:

- Conducting respiratory exposure evaluations
- Assist departments in respirator/cartridge selection
- Providing training
- Conducting fit tests
- Maintain records
- Evaluating the program
- Updating the written program as necessary to reflect workplace changes

The department administrator’s duties include:

- Coordinating with the Program Administrator on how to address respiratory hazards or other concerns regarding the program
- Identifying work areas, processes, or tasks that require evaluation for respiratory exposure evaluations
- Monitoring respiratory use to ensure that respirators are used in accordance with their certifications
- Ensuring that employees under their supervision (including new hires) have received appropriate training, fit testing, and medical evaluation
- Ensuring the availability of appropriate respirators and accessories
- Ensuring proper storage and maintenance of respiratory protection equipment
- Being aware of tasks requiring the use of respiratory protection
- Enforcing the proper use of respiratory protection when necessary
- Ensuring that respirators are properly cleaned, maintained, and stored according to the respiratory protection plan
- Ensuring that respirators fit well and do not cause discomfort
- Continually monitoring work areas and operations to identify changes in respiratory hazards

Each employee has the responsibility to wear his or her respirator when and where required and in the manner in which they were trained. Employees must also:

- Care for and maintain their respirators as instructed and store them in a clean and sanitary location.
- Inform their supervisor if the respirator no longer fits well and request a new one that fits properly.
- Inform their supervisor or the Program Administrator of any respiratory hazards that they feel are not adequately addressed in the workplace and of any other concerns that they have regarding the program.
- Notify their supervisor or the Program Administrator of any other problems associated with using their respirator.
SELECTION OF RESPIRATORS
Proper respirator selection involves choosing a device that provides protection from the respiratory hazards to which the employee may be exposed, and permits the employee to perform the job with the least amount of physical burden. Selection factors included in respirator selection include the following:

- Nature of the hazard (physical and chemicals hazards)
- Concentration of the hazard/contaminant
- Permissible exposure limit and/or other occupational exposure limits
- Nature of the work operation/process
- Time period the respirator is worn
- Work activities and physical/psychological stress
- Fit testing
- Physical characteristics, functional capabilities, and limitations of respirators

Respirators and cartridges will be selected based on the hazards to which workers are exposed and in accordance with WISHA standards.

- Identification of respiratory sources and development of hazards substances list
- Review of work processes to determine where hazardous exposures occur and the magnitude of the exposures
- As needed, conduct exposure monitoring to determine levels of hazardous substances
- Identify engineering controls used to minimize exposure

Each shop supervisor will determine which employees have the potential for exposure by using the EH&S Form: Supervisor’s Respiratory Protection Designation Form. This form should be filled out by the supervisor for any employee who is at potential risk to an airborne contaminant. This form is submitted to EH&S, who will conduct a respiratory exposure evaluation for the employee.

RESPIRATORY EXPOSURE EVALUATIONS
A respiratory exposure evaluation is conducted to determine or reasonably estimate whether an employee is or could be exposed to either of the following:

- An airborne contaminant above the permissible limit listed in the Permissible Exposure Limits for Airborne Contaminants Table found in WAC 296-841
- Other airborne hazards such as biological
- Oxygen deficiencies
  - Oxygen deficiencies may also occur due to
    - Processes such as fermentation, decomposition of organic matter, or combustion of fossil fuels
    - Displacement by another gas such as nitrogen or carbon dioxide

Note that rules for specific substances may contain additional requirements.

EH&S will do the following when performing a respiratory exposure evaluation:
- Determine the form of the airborne contaminant (dust/mist/gas/biological agent)
- Do not use protection provided by respirators as a factor when determining levels of airborne hazard(s)
- Make sure air monitoring results used to determine exposures are based on personal air samples taken from an employee’s breathing zone
- Include potential emergency and rescue situations that may occur, such as equipment or power failures, uncontrolled chemical reactions, fire, explosions, or human error
- Include workplace conditions such as work process, types of material, exposure control methods, work practice, and environmental conditions
- Address extended work periods (greater than 8-hour shifts)

Each shop supervisor will determine which employees have the potential for exposure by using the Supervisors Respiratory Protection Designation Form. The following duties, tasks or activities are some examples of potential exposure:

<table>
<thead>
<tr>
<th>Employee position/activity</th>
<th>Exposures</th>
<th>NIOSH APPROVED RESPIRATORS ASSIGNED</th>
<th>Frequency of use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation Maintenance/Asbestos Abatement</td>
<td>Potential exposure to asbestos containing materials.</td>
<td>APR and FFPD</td>
<td>Routinely</td>
</tr>
<tr>
<td>Paint Shop</td>
<td>Various oil, latex and water based paints and solvents.</td>
<td>APR with appropriate cartridge for the potential chemical exposure.</td>
<td>Routinely</td>
</tr>
</tbody>
</table>

Types of respiratory protection shall be based on potential hazards (chemical, dust, asbestos, low oxygen or unknown), duration of usage, personal fit, Etc.

**NIOSH Certification**

All respirators must be certified by the National Institute for Occupational Safety and Health (NIOSH) and shall be used in accordance with the terms of that certification. All filters, cartridges, and canisters must be labeled with the appropriate NIOSH approval label. The label must not be removed or defaced while it is in use.

**MEDICAL EVALUATIONS**

Employees using respirators must be physically able to perform the work while using the respirator. Accordingly, EWU has the responsibility of ensuring that employees are physically fit and able to tolerate the physical and psychological stress imposed by respirator use, as well as physical stress originating from the job and workplace conditions. Employees will not be allowed to wear respirators until a physician or other licensed health care professional (PLHCP) has determined they are medically able to do so. Any employee refusing the medical evaluation cannot work in an area requiring respirator use.

Note: Employees voluntarily using filtering facepiece respirators (dust masks) and employees using loose fitting escape only respirators, provided that is the only respirator used, are exempt from the requirements of the medical evaluation.
MEDICAL QUESTIONNAIRE ADMINISTRATION

Employees assigned to tasks requiring the use of respirators will be required to complete the “WISHA Respirator Medical Evaluation Questionnaire” (Ref.: WAC 296-62-07255, Appendix C). The Program Administrator will make available a copy of the questionnaire to all employees requiring medical evaluations. The medical evaluation will be administered confidentially and during working hours at a place on site that is convenient to employees.

Completed questionnaires are confidential and should be sealed in an envelope with the employees name written on the outside of the envelope. They should then be forwarded to EH&S where they will be sent to the medical provider without review by management.

To the extent feasible for maintaining confidentiality, the Program Administrator or his/her designee will aid employees who are unable to read the questionnaire by providing reading assistance. To ensure confidentiality, the questionnaire will not be reviewed at any time by the Program Administrator or designee. The Program Administrator or designee will not review completed questions and there will be no employee/employer interaction that could be considered a breach of confidentiality. Where confidentiality cannot be maintained during administration of the questionnaire, the employee will be sent to the PLHCP for medical evaluation.

If needed, employees will have the opportunity to discuss the questionnaire content and/or examination results with the PLHCP via telephone call. During questionnaire administration, the PLHCP's phone number will be given to employees and access to a phone will be provided at no charge to the employee. All records from medical evaluations, including completed questionnaires, will remain confidential between the employee and the PLHCP.

If the medical questionnaire indicates to the medical provider that a more comprehensive medical exam is required, it will be provided at no cost to the employee. The medical provider will make a determination on whether or not the employee is medically able to wear a respirator.

The company will provide additional medical evaluation or medical re-evaluation for any employee when:

- The employee reports medical signs or symptoms that are related to the employee's ability to use a respirator.
- A PLHCP, supervisor, or the respirator program administrator observes that the employee is having a medical problem during fit testing or workplace respirator use.
- Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee re-evaluation.
- A change occurs in workplace conditions (e.g., physical work effort, type of respirator used, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

The content of such additional medical evaluations will be determined by the PLHCP.

MEDICAL EVALUATION FREQUENCY TABLE

<table>
<thead>
<tr>
<th>Type of Evaluation</th>
<th>When Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Evaluation</td>
<td>Prior to fit testing or use of respirators in the workplace</td>
</tr>
<tr>
<td>Subsequent Evaluations</td>
<td>If any of these occur:</td>
</tr>
<tr>
<td></td>
<td>• PLHCP recommendation</td>
</tr>
</tbody>
</table>

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PLHCP’s Written Recommendations

EWU will obtain a written recommendation from the PLHCP on whether/or not the employee is medically able to wear a respirator. The recommendation must identify any limitations on the employee's use of the respirator, as well as the need for periodic or future medical evaluations that are required by the PLHCP.

The employee will receive a copy of the PLHCP’s written recommendations directly from the PLHCP. Information concerning diagnosis, test results, or other confidential medical information will not be disclosed to the company by the PLHCP.

RESPIRATOR FIT-TESTING

Fit testing is required for all employees required to use a respirator with a tight-fitting facepiece. EWU EH&S department will conduct fit testing for EWU employees required to wear respirators. Fit testing will be performed:

- After an employee has completed their medical examination and prior to wearing a tight-fitting respirator in the work environment
- At least annually thereafter
- Whenever a different respirator is used (Employees will be fit tested with the respirator assigned to them)
- When there are changes in the employee’s physical condition that could affect respiratory fit (e.g., obvious change in body weight, facial scarring, facial surgery, major dental work, etc.)
- Note that no beards are allowed on employees required to wear tight-fitting respirators as part of their job

Fit testing of tight-fitting power air purifying respirators (PAPRs) and supplied air respirators will be conducted in negative pressure mode (i.e., with the fan motor turned off or no supplied air).

Documentation of fit-test results is kept in the EH&S Department.

FIT TEST PROCEDURES

Qualitative fit tests may be provided to employees whose exposure will not exceed airborne concentrations in excess of 10 times the PEL. Quantitative fit tests are required for any employee whose exposure may exceed airborne concentrations in excess of 10 times the PEL. EWU will typically provide quantitative fit tests for all EWU employees regardless of airborne concentrations.

Fit tests will be conducted following the appropriate WISHA accepted fit tests protocols found in WAC 296-62-07201, WAC 296-62-07205, and WAC 296-62-07162. The EWU guidance documents Qualitative Fit Test Protocol and Quantitative Fit Test Protocol provide direction on fit testing.
RESPIRATOR USE
Once the respirator has been properly selected and fitted, it is necessary to ensure that the respirator is used properly in the workplace. The following conditions may compromise the effective use of the respirator and jeopardize worker protection:

- Facepiece seal leakage
- Removing respirator at the wrong times in hazardous atmospheres
- Not properly performing seal checks
- Not properly repairing defects

Department supervisors are required to routinely evaluate workplace conditions, changes in the degree of employee exposure, and changes in physical stress to ensure that appropriate respiratory protection used by each employee.

FACEPIECE SEAL PROTECTION
Supervisors will not permit respirators with tight-fitting facepieces to be worn by employees who have conditions that would compromise the facepiece-to-face seal. Examples of these conditions include facial hair (e.g., beard, stubble, bangs) that interfere with the facepiece seal or valve function, absence of normally worn dentures, facial deformities, or the use of jewelry or headgear that projects under the facepiece seal.

Corrective glasses or goggles, or other personal protective equipment, must be worn in such a way that they do not interfere with the seal of the facepiece to the face. Full-facepiece respirators will be provided where either corrective glasses or eye protection is required, since corrective lenses can be mounted inside a full-facepiece respirator. The use of contact lenses with respirators where the wearer has successfully worn such lenses before will be allowed.

A user seal check (also known as a fit check) will be performed every time a tight-fitting respirator is put on or adjusted to ensure proper seating of the respirator to the face. The user seal check conducted must be either the positive and/or negative pressure checks described in EH&S Guidance document Respirator Seal Check Instructions or the manufacturers recommended procedures when equally protective.

RESPIRATOR STORAGE MAINTENANCE AND CARE
To ensure that the respirator remains serviceable and delivers effective protection, a maintenance program must be in place prior to respirator use and must address:

- Cleaning and disinfecting procedures.
- Proper storage.
- Regular inspections for defects (including leak check).
- Repair methods.
- End of Service Life indicators on cartridges and/or canister/cartridge replacement schedules

CLEANING AND DISINFECTING
Respirators will be cleaned according to the manufacturer’s instructions the EH&S Guidance Document Respirator Cleaning Instructions. Respirators will be cleaned and disinfected as follows:
• Employees respirators will be cleaned and disinfected as often as necessary to be maintained in a sanitary condition (employees will be responsible to clean and disinfect their respirators).
• Respirators maintained for emergency use as will be cleaned and disinfected after each use (employee using the respirator will be responsible to clean and disinfect after use).
• Respirator used my more than one employee will be cleaned and disinfected prior to being used by a different individual (by the employee using the respirator).

STORAGE
Respirators will be stored so that they are protected against damage, contamination, dust, sunlight, temperature extremes, excessive moisture, and damaging chemicals. When respirators are packed or stored, the facepiece and exhalation valve will be stored in a manner that prevents deformation. Each respirator should be positioned so that it retains its natural configuration.

Emergency use respirators will not be kept in any area that might itself be involved in the emergency because such an area may become contaminated or inaccessible. Emergency use respirators will be stored in compartments or covers that are clearly marked to indicate that they contain emergency respirators and stored according to any applicable manufacturer instructions.

INSPECTION
Respirators will be inspected in accordance with the manufacturer's instructions and checked for proper function before and after each use. Respirator inspections will 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. In addition, the elastomeric parts must be evaluated for pliability and signs of deterioration.

• Respirators used in routine situations will be inspected before each use and during cleaning.
• Respirators designated for use in an emergency situation will be inspected at least monthly.
• Respirators designated for use in an emergency situation will be inspected at least monthly and in accordance with the manufacturer's instructions and checked for proper function before and after each use.
• Emergency escape-only respirators must be inspected before being carried into the workplace.
• Self-contained breathing apparatus (SCBA) will be inspected monthly and after each use. Regulators and warning devices on SCBAs must be inspected monthly to ensure that they function properly. The monthly inspection will also make sure that cylinders are in a fully charged capacity (i.e., 90% of the manufacturer’s recommended pressure level).

Respirators that are maintained for use in emergencies will be certified by documenting the date that the inspection was performed, the name or signature of the inspector, the findings of the inspection, any required remedial action, and a serial number or other means of identifying the inspected respirator. This information will be provided on the tag/label that is attached to the storage compartment for the respirator.

All respirators will be inspected before and after every use and during cleaning. In addition, respirators will be inspected for damage, deterioration or improper functioning and repaired or replaced as needed.
REPAIR
Department Supervisors will ensure that respirators which fail to pass inspection or are otherwise found to be defective will be removed from service and repaired or adjusted properly. If a respirator cannot be repaired or adjusted it will be discarded.

Repairs or adjustments to respirators will be done by EH&S. Only NIOSH-approved manufacturer’s replacement parts designed for that respirator will be used. Repairs will be made in accordance with the manufacturer’s recommendations and specifications regarding the type and extent of repairs to be performed.

Because components such as reducing and admission valves, regulators, and alarms are complex and essential to the safe functioning of SCBAs, they are required to be adjusted and repaired only by the manufacturer or a technician trained by the manufacturer.

- SCBA’s air and oxygen cylinders will be maintained in a fully charged state and recharged when the pressure falls to 90% of the manufacturer's recommended pressure level. Cylinders will be recharged.

- SCBA air and oxygen cylinders will be hydrostatically tested according the manufacturers recommended frequency. Hydrostatic testing will be conducted by [Name of vendor]. All composite-wrapped aluminum cylinders will be taken out of service after 15 years regardless of the last hydrostatic test date.

BREATHING AIR QUALITY
The Department Supervisor will ensure that breathing air for atmosphere-supplying respirators will be of high purity, meets quality levels for content, and does not exceed certain contaminant levels and moisture requirements.

Compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration must be in accordance with the specifications found in WAC 296-842-20005.

For supplied-air respirators (SARs), only Grade D breathing air shall be used in cylinders. The Program Administrator or designee will coordinate deliveries of compressed air and require certification that the air in the cylinders meets the specifications of Grade D breathing air. Moisture content in the cylinders will not exceed a dew point of −50°F (−45.6°C) at 1 atmosphere pressure. (Note: This requirement will prevent respirator valves from freezing, which can occur when excess moisture accumulates on the valves). All breathing gas containers must be marked in accordance with the NIOSH respirator certification standard, 42 CFR part 84. The Department Supervisor will maintain a minimum air supply of one fully charged replacement cylinder for each SAR unit.

COMPRESSORS
Compressors used for supplying breathing air must be constructed and situated so contaminated air cannot enter the air-supply system. The location of the air intake will be in an uncontaminated area where exhaust gases from nearby vehicles, the internal combustion engine that is powering the compressor itself (if applicable), or other exhaust contaminants being ventilated will not be picked up by the compressor air intake.
Compressors will be equipped with suitable in-line, air-purifying sorbent beds and filters to further ensure breathing air quality and to minimize moisture content so that the dew point at 1 atmosphere pressure is 10°F (5.56°C) below the ambient temperature. Sorbent beds and filters will be maintained and replaced or refurbished periodically according to the manufacturer's recommendations. An inspection tag will be kept at the compressor indicating the most recent change date and the signature of the Department Supervisor or designee authorized to perform the maintenance.

Only non-oil-lubricated compressors will be used. The Department Supervisor will ensure that the compressor intake will not allow the introduction of carbon monoxide greater than 10 parts per million (ppm) into the system (Note: this could be from sources other than the compressor such as forklifts/vehicles or other gas powered equipment). Where this is not possible or feasible, it may be necessary to combine the use of a carbon monoxide alarm with a carbon monoxide sorbent bed when conditions are such that a reliable carbon monoxide-free area for air intake cannot be found.

For oil-lubricated compressors, you must use a high-temperature or carbon monoxide (CO) alarm, or both, to monitor CO levels. If only high-temperature alarms are used, the air supply must be monitored at intervals sufficient to make sure the concentration of CO in the breathing air does not exceed 10 ppm.

Breathing air couplings must be incompatible with outlets for non-respirable plant air or other gas systems to prevent accidental servicing of airline respirators with non-respirable gases or oxygen. No asphyxiating substance (e.g., nitrogen) will be allowed in the breathing airlines.

**IDENTIFICATION OF FILTERS, CARTRIDGES AND CANISTERS**

The Program Administrator will ensure that all filters, cartridges, and canisters used in the workplace are labeled and color-coded with the NIOSH approval label, and ensure that the label is not removed and remains legible. “WAC 296-62-07184 Table 3 -- Color Coding of Respirator Filters, Cartridges and Canisters” provides color-coding information.

Check with the respirator vendor for a recommended replacement schedule for each brand and type of respirator. Shop supervisors will complete the Supervisors Respiratory Protection Designation Form for each employee with the potential for hazardous respiratory exposure. Below is an example of types of cartridges needed for specific duties.

<table>
<thead>
<tr>
<th>Type of respirator cartridge</th>
<th>Location or job duties</th>
<th>Chemicals in use</th>
<th>Replacement schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIOSH OV/P100</td>
<td>Asbestos Abatement</td>
<td>Spray adhesives, Particulates</td>
<td>As needed.</td>
</tr>
</tbody>
</table>

Respirator Use

EH&S will monitor the work area in order to be aware of changing conditions where employees are using respirators.

Employees will not be allowed to wear respirators with tight-fitting facepieces if they have facial hair (e.g., stubble, bangs) absence of normally worn dentures, facial deformities (e.g., scars, deep skin creases, prominent cheekbones), or other facial features that interfere with the facepiece seal or valve function. Jewelry or headgear that projects under the facepiece seal is also not allowed.
If corrective glasses or other personal protective equipment is worn, it must not interfere with the seal of the facepiece to the face.

Full-facepiece respirators can be provided with corrective glasses since corrective lenses can be mounted inside a full-facepiece respirator. Contact lenses can also be used with full facepiece respirators if they do not cause any problems for the employee.

A seal check will be performed every time a tight-fitting respirator is put on. Refer to Guidance Document G10 Respirator Seal Check Instructions.

The employee will make sure that the NIOSH labels and color-coding on respirator filters and cartridges remain readable and intact during use.

Employees will leave the area where respirators are required for any of the following reasons:

- to replace filters or cartridges,
- when they smell or taste a chemical inside the respirator,
- when they notice a change in breathing resistance
- to adjust their respirator,
- to wash their faces or respirator,
- if they become ill,
- if they experience dizziness, nausea, weakness, breathing difficulty, coughing, sneezing vomiting, fever or chills.

Respiratory Program Evaluation

EH&S will evaluate the respiratory program for effectiveness by:

1. Checking results of fit-test results and health provider evaluations.
2. Talking with employees who wear respirators about their respirators
   a. How they fit, do they feel they are adequately protecting them?
   b. Do they notice any difficulties in breathing while wearing them?
   c. Do they notice any odors while wearing them, etc…?
3. Periodically checking employee job duties for changes in chemical exposure.
4. Periodically checking maintenance and storage of respirators.
5. Periodically checking how employees use their respirators.
6. Conducting annual fit tests and update training.

Recordkeeping

The following records will be kept in Environmental Health and Safety (EH&S)

- A copy of this completed respirator program
- Employees’ latest fit-testing results
- Employee training records
- Written recommendations from our medical provider

The records will be kept at the EH&S Department and shop or department where the employee works. Employees will have access to these records.
HOW TO SELECT THE CORRECT RESPIRATOR

The type and brands of respirators vary widely ranging from simple dust masks to supplied air respirators like firefighters wear. Following is a description of the main types of respirators.

<table>
<thead>
<tr>
<th>Assigned Protection Factors (APF) for Respirator Types</th>
<th>APF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air-purifying respirator (APR) with a:</strong></td>
<td></td>
</tr>
<tr>
<td>• Half-facepiece</td>
<td>10</td>
</tr>
<tr>
<td>• Full-facepiece</td>
<td>100</td>
</tr>
<tr>
<td><em>Half-facepiece includes ¼ masks, filtering facepieces (dust masks), and elastomeric (rubber) facepieces</em></td>
<td></td>
</tr>
<tr>
<td><strong>Supplied Air-line respirator with a:</strong></td>
<td></td>
</tr>
<tr>
<td>• Half-facepiece and designed to operate in demand mode</td>
<td>10</td>
</tr>
<tr>
<td>• Loose-fitting facepiece and designed to operate in continuous flow mode</td>
<td>25</td>
</tr>
<tr>
<td>• Half-facepiece and designed to operate in continuous-flow, or pressure-demand mode</td>
<td>50</td>
</tr>
<tr>
<td>• Full-facepiece and designed to operate in demand mode</td>
<td>100</td>
</tr>
<tr>
<td>• Full-facepiece and designed to operate in continuous-flow or pressure-demand mode</td>
<td>1000</td>
</tr>
<tr>
<td>• Helmet or hood and designed to operate in continuous-flow mode</td>
<td>1000</td>
</tr>
<tr>
<td><strong>Self-contained breathing apparatus (SCBA) with a tight fitting:</strong></td>
<td></td>
</tr>
<tr>
<td>• Half-facepiece and designed to operate in demand mode</td>
<td>10</td>
</tr>
<tr>
<td>• Full facepiece and designed to operate in demand mode</td>
<td>100</td>
</tr>
<tr>
<td>• Full-facepiece and designed to operate in pressure-demand mode</td>
<td>10,000</td>
</tr>
<tr>
<td><strong>Combination respirators:</strong></td>
<td></td>
</tr>
<tr>
<td>• Find the APF for each type of respirator in the combination.</td>
<td></td>
</tr>
<tr>
<td>• Use the lower APF to represent the combination</td>
<td>The Lowest Value</td>
</tr>
</tbody>
</table>

Use the Tables below to determine the appropriate type of respirator and Cartridge Type

<table>
<thead>
<tr>
<th>Filter/Cartridge Contaminant Color Coding.</th>
<th>Assigned Color</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Atmospheric Contaminant</strong></td>
<td></td>
</tr>
<tr>
<td>Acid Gases</td>
<td>White</td>
</tr>
<tr>
<td>Organic Vapors</td>
<td>Black</td>
</tr>
<tr>
<td>Ammonia Gas</td>
<td>Green</td>
</tr>
<tr>
<td>Carbon Monoxide Gas</td>
<td>Blue</td>
</tr>
<tr>
<td>Acid Gases and Organic Vapors</td>
<td>Yellow</td>
</tr>
<tr>
<td>Acid Gases, Ammonia, and Organic Vapors</td>
<td>Brown</td>
</tr>
<tr>
<td>Acid Gases, Ammonia, Carbon Monoxide, and Organic Vapor</td>
<td>Red</td>
</tr>
<tr>
<td>Other Vapors and Gases not listed above</td>
<td>Olive</td>
</tr>
<tr>
<td>Radioactive Materials (except Tritium and Noble Gases)</td>
<td>Purple (magenta)</td>
</tr>
<tr>
<td>Asbestos, Mold</td>
<td>Purple (magenta)</td>
</tr>
<tr>
<td>Dusts, Fumes, and Mists (other than radioactive materials)</td>
<td>Purple (magenta)</td>
</tr>
</tbody>
</table>

*Verify the correct cartridge type with the make and model of the respirator being used as well as the contaminant type. Stacked/combination cartridges are also available.*
**Requirements for Selecting Air-Purifying Respirators & Cartridges**

<table>
<thead>
<tr>
<th>Solution</th>
<th>Contaminant Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide a respirator with canisters or cartridges equipped with a NIOSH-certified, end-of-service-life indicator (ESLI) (note: there are just a few of these).</td>
<td>Gas or Vapor</td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>If a canister or cartridge with an ESLI is <strong>not</strong> available, develop a cartridge change schedule to make sure the canisters or cartridges are replaced before they are no longer effective (note: most cartridge respirators fit in this category).</td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>Select an air-supplying respirator.</td>
<td></td>
</tr>
</tbody>
</table>

| Select respirators with filters certified to be at least 95% efficient by NIOSH. For example, N95s, R99s, P100s, or High Efficiency Particulate Air filters (HEPA). | Large Particles, such as dust, spray, mist, fog, fumes, or aerosols |
| OR                                                                      |                                    |
| You may select respirators NIOSH certified as “dust and mist,” “dust, fume, or mist,” or “pesticides.” You can only use these respirators if particles primarily have a mass median aerodynamic diameter of at least 2 micrometers. Note: These latter respirators are no longer sold for occupational use, but some employers may still be using them. |                                    |

**A. Dust Masks (filtering face pieces)**

These simple, two-strap disposable dust masks are designed only for dusts. They are not as protective as other respirators, but do an adequate job in many cases, unless the dust is toxic or copious. Don’t confuse these two-strap masks with the less protective one-strap dust mask designed only for pollen or non-toxic dust. Refer to Guidance Document G11 Dust Mask [Fitting Instructions](#).

**B. Half-Face Air-Purifying Respirator**

These respirators are sometimes called “half-face” or “half-mask” respirators since they cover just the nose and mouth. They have removable cartridges that filter out either dust, chemicals or both. Selecting the correct cartridges is essential since they are designed for particular types of chemicals or dust. A reputable respirator vendor can assist you in selecting the correct cartridges. These cartridges are typically removable and sometimes interchangeable. Cartridges are available for solvents, ammonia, chlorine, acids and other chemicals. The cartridges must be changed out or replaced periodically, especially for chemicals, since they can absorb only so much contaminant before breakthrough occurs. A few cartridges are equipped with end-of-service indicators that show when a cartridge should be replaced. Most cartridges don’t have this indicator and you a change-out schedule must be developed to prevent breakthrough. The change-out schedule is based on the chemical concentration, physical work effort, temperature and humidity. Many respirator manufacturers have cartridge change schedule calculators available on the Internet.
C. Full-Face Air-Purifying Respirator

In some situations, a full face respirator may be recommended or preferred. This type of respirator is typically used when the air contaminant irritates or affects the eyes. They also provide a higher respiratory protection level to the lungs since they tend to fit better and are less prone to leaking. These respirators also have replaceable cartridges that must be changed on a regular basis as described above for half-face respirators.

D. Powered Air Purifying Respirator (PAPR)

Powered Air Purifying Respirators have a battery pack that draws air through replaceable cartridges and blows into a full facepiece, helmet or hood. These respirators are often more comfortable in hot weather and can provide more protection, depending on the type. The cartridges must be changed regularly as described for half-face respirators above.

E. Supplied Air Respirators

There are two types of supplied air respirators:

- **Airline respirators**
- **Self-Contained Breathing Apparatus (SCBA)**

Use of these respirators is limited to the Asbestos Abatement Shop and EH&S. These respirators are designed for hazardous or potently hazardous atmospheric conditions. The use of these respirators is covered in WAC 296-842-200. All SCBAs and air-line respirators must be provided with safe breathing air and oxygen and must meet the following specifications for Grade D air:

- Oxygen (volume/volume) within 19.5-23.5%
- Hydrocarbon (condensed): no more than 5 milligrams per cubic meter of air
- Carbon **monoxide** (CO): no more than 10 parts per million (ppm)
- Carbon **dioxide** (CO2): no more than 1,000 ppm
- No noticeable odor
- Moisture content must not exceed a dew point of 50°F for cylinder supplied air and 10°F for compressor supplied air.
- Cylinders of breathing air purchased or otherwise obtained from a supplier must have a certificate of analysis from the supplier verifying each cylinder's contents meet Grade D breathing air requirements and dew point standards.
- **Do not** supply compressed oxygen to SCBAs or air-line respirators that previously used compressed air. Compressed air leaves residues containing hydrocarbons such as oil or grease. Fire or explosion can occur if compressed oxygen makes contact with these residues.
Cylinders
Cylinders used to supply breathing air for SCBAs or air-line respirators must be tested and maintained as described in the federal Department of Transportation’s (DOT) Shipping Container Specification Regulations, Title 49 CFR.

Use only cylinders marked (with serial number, cylinder pressure, DOT exemption number, and test dates) according to these DOT regulations.

Compressors
Compressors must not create a hazardous breathing air supply therefore, locate or modify compressor intakes so they won’t pick up contaminated air or exhaust gases such as carbon monoxide (CO).

Equip compressors with suitable air-purifying filters, water traps, and sorbents (such as charcoal beds) and maintain them as follows:
(a) Periodically change or clean them according to the manufacturer or supplier’s instructions
(b) Keep a tag at the compressor with the following information:
   – When the sorbent and filters were last replaced or cleaned
   – The date of the most recent changes or cleaning
   – The signature of the person authorized by the employer to perform changes or cleaning.

Make sure the CO level in breathing air from compressors does not exceed 10 parts per million (ppm). Maintain CO levels below 10 ppm in oil lubricated compressors by using at least one of the following:
(a) An effective CO alarm
(b) An effective high temperature alarm and testing the air supply often enough to prevent CO levels from exceeding 10 ppm.

How often to test depends on a number of considerations, for example:
   – Compressor age
   – Maintenance history of the compressor
   – Stability of CO readings

Training and Use
Specific training on SCBA and air-line respirators is required before use. Two people must always be present when using these types of respirators. An attendant is required at the compressor during use. Monitoring should be performed to ensure that at no time will employees enter areas of low oxygen below 19.5%, high oxygen levels above 23.5%, or atmospheres that contain chemicals that produce an Immediately Dangerous to Life or Health (IDLH) conditions.