MOUNT ROYAL UNIVERSITY 1910

SAFE WORK PROGRAM:
RESPIRATORY PROTECTION

CONTENTS

PREAMBLE

This program outlines the mandatory requirements for selection, use, and care of approved respiratory protection at Mount Royal University.

Personal Protective Equipment (PPE), including respiratory protection, is the last line of defense against identified hazards. Respiratory protection shall be used to protect a user from airborne contaminants only when engineering or administrative control measures are not practicable or adequate.

Respirators will only provide proper protection if they are properly selected, fit tested, worn and used properly, cleaned and sanitized, inspected and maintained, and the cartridges and filters are changed out appropriately.

Respiratory hazards can include airborne contaminants such as biological contaminants, dusts, mists, fumes, and gases, or oxygen-deficient atmospheres. More than one respiratory hazard can be present at the same time and the protection supplied must be sufficient to protect the user from all of them.

SCOPE

This procedure applies to all MRU employees when performing work on behalf of the University, whether on or off campus. This program will also apply to contractors performing work on behalf of the University on campus when they do not have an equivalent policy or program in place.

LEGISLATION

Alberta's Occupational Health and Safety (OHS) Code outlines requirements for respiratory protection in Part 18, Sections 244 to 255. Occupational exposure limits (OELs) can be found in Alberta OHS Code Schedule 1, Table 2.

Respiratory protective equipment is selected and fitted as per CSA Standard Z94.4-02, Selection, Use and Care of Respirators.

RESPONSIBILITIES

Presidents, Vice-Presidents:

- Provide management support and leadership necessary to provide a safe and healthy working environment for employees and students, in compliance with the Mount Royal Health and Safety Policy.
- Ensure that adequate resources are available to implement appropriate measures.

Associate Vice-Presidents, Deans, Directors, and Department Managers:

- Ensure that this safety program is communicated to affected employees.
- Ensure that this safety program is understood and followed by affected workers.
- Identify work areas or processes that may require air monitoring, airborne hazard assessments, or respiratory protection.

- Develop engineering and / or administrative controls for identified airborne hazards, where reasonable and practicable.
- Supply appropriate respiratory protective equipment for employees as required.

Supervisors / Chairs:

- Complete Position Hazard Assessments for roles within the department to determine what tasks (if any) include an atmospheric hazard and may require respiratory protection or other controls.
- Monitor respirator use in relation to workplace conditions to ensure that respiratory protection program requirements are being met.
- Monitor work areas and tasks to ensure that respiratory protecting being used continues to be adequate for conditions.
- Ensure that workers required to use respiratory protection are provided with appropriate training on the use, care, and maintenance of equipment.
- Ensure that respirators are used cleaned, inspected, maintained, and stored in accordance with instructions.
- Notify Environmental, Health & Safety (EH&S) of any incidents involving respiratory protection or concerns with respirator use.

MRU Employees (Staff, Faculty, or Volunteers):

- Use and care for respirators in accordance with this program and the training received.
- Report to their supervisor any changes to the work area or processes that may change the effectiveness of the assigned respirator (e.g. changes to airborne contaminant concentration).
- Report to their supervisor if there is any change or condition that may impair their ability to use a respirator safely (e.g. changes to health or face, such as weight loss / gain, onset of respiratory conditions, or dental surgery).
- Check that the respirator is clean and in good operating condition with the correct filters or cartridges prior to each use; perform seal checks after donning a fitted respirator; and store respirator correctly when not in use.

Contractors:

- Required to have respirator protection procedures or policies that meet or exceed applicable legislation, when applicable to their work scopes.
- Contractor policy will apply to their employees and subcontractors when performing work on MRU property.

Environmental, Health & Safety (EH&S):

- Assist with Position and Field Level Hazard Assessments, as required, to identify respiratory hazards and appropriate controls.
- Arrange for air monitoring and sampling to be performed by qualified third party contractors, as required or requested.
- Provide respirator protection training and fit testing for employees.

- Maintain respirator fit testing and pre-screening records.
- Provide guidance to departments on the selection of appropriate respiratory protection for airborne hazards in their area.

Human Resources (HR)

- Coordinate medical surveillance when required.
- Inform workers whether their test results were normal or abnormal and organize follow-up assessments as required.
- Enlist a qualified and approved third-party provider to maintain medical records as outlined in the Alberta OHS Code and applicable privacy legislation.
- Coordinate with employee supervisors when work restrictions or modifications are required.

HAZARD ASSESSMENT

A hazard assessment for the task or work area must be completed and understood by all workers to determine the respiratory hazards present and assist in selection of the appropriate respirator when needed. It is important to select a level of respiratory protection that will protect against all hazards involved.

Position Hazard Assessments (PHAs) are completed for each job position in the University, and identify tasks that may include respiratory hazards, along with recommended controls. Field Level Hazard Assessments, which address any additional hazards not captured on the PHA, are completed just prior to work start and any time the work area or conditions change.

When assessing atmospheric contaminants, two broad categories of contaminants should be considered:

- **Non-bioaerosols:** Non-biological airborne particles, gases, or vapours.
    - Examples of particulate contaminants that may be encountered at MRU include dust encountered during carpentry activities or when removing ceiling panels.
    - Examples of gases and vapours (mists, fumes) that may be encountered at MRU include methane gases from sump pumps, off-gassing from welding activities, fertilizer and pesticide mists, and spray paint.
    - To evaluate the hazard(s) and determine the appropriate respiratory protection required, refer to the information and form provided in Appendix A: Hazard Assessment and Respirator Selection – Non-Bioaerosols.
- **Bioaerosols:** A bioaerosol is a suspension of airborne particles that contain living organisms or were released from living organisms. These particles are very small (less than 100 micrometers in diameter) and can cause illness, allergic responses, or respiratory irritation.
    - Common bioaerosols that may be encountered at MRU include animal droppings or pollen.
    - Hazard assessments for bioaerosols shall be completed by the supervisor with assistance from EH&S. An external industrial hygienist will be consulted in cases where there is a high risk of negative health effects. This program only covers exposure through inhalation; for other routes of exposure, consult the Biosafety Manual.

- Bioaerosols are a form of particulate that must be evaluated following different criteria than those used for non-bioaerosols. Follow the instructions and form provided in Appendix B: Hazard Assessment and Respirator Selection – Bioaerosols to complete the hazard assessment and determine the appropriate respiratory protection required

The atmospheric hazard assessment should also consider:

- Respiratory hazards in the work environment (e.g. pollen, dust)
- Respiratory hazards created by the task being completed (e.g. fumes emitted from welding or brazing activities, gases formed by chemical reactions, dusts stirred up by work activity)
- Engineering controls available, including ventilation (natural and mechanical)
- Administrative controls, including training, work / rest schedules, and signage

In some cases, air monitoring may be completed. This is based on a review of the work activity including frequency, duration, concentration and quantity of the chemical being used or bio-aerosol present, established occupational exposure limits, and controls in place for the activity. When air monitoring is not required or feasible based on the activity review, the use of respiratory protective equipment is left to the discretion of the supervisors and workers under the guidance of EH&S.

In some work areas, installed air monitoring devices will indicate if respiratory protection is required to access the area. Obey all alarms and do not enter areas under alarm unless required to do so, and not without the correct protective equipment.

When responding to emergencies that may present respiratory hazards, such as hazardous materials spills or a biosafety cabinet alarms, respiratory protection is mandatory. Perform a hazard assessment to determine the most likely contaminants and the highest potential concentrations, and don the corresponding protection. Once the area has been inspected, the required PPE may be downgraded if the hazard is less severe than anticipated.

RESPIRATOR SELECTION

Once the hazard assessment has been completed and the atmospheric hazards have been determined, the appropriate respiratory protection shall be determined by completing the tables in Appendix A or B, and referring to the Respiratory Selection Flowchart in Appendix C (when appropriate).

Respirator selection must be appropriate to the contaminant and its concentration, and take into consideration the level of protection provided by the respirator. Additional considerations include the duration of exposure to the contaminant, user comfort and interaction of the respirator with other PPE (e.g. safety glasses, or hearing and head protection), warning properties of the hazard, and the need for emergency escape.

Both personnel advising on respirator selection and the end user must know and understand the limitations of the selected respirators as outlined by regulatory agencies, manufacturers, and MRU.

All respirators used at MRU must be NIOSH or CSA approved.

RESPIRATOR CLASSIFICATION

Respirators can be classified into two main types: Air Purifying Respirators and Supplied Air Respirators (SARs). The table below provides information on sub-types, how they work, and general guidance on when they should be used. The specific respirator type selected must address the hazards identified.

AIR PURIFYING RESPIRATORS

Air Purifying Respirators remove contaminants in the air by filtering out particulates or by adsorbing gases or vapours on an adsorbing material in a cartridge or canister. They do not supply oxygen and are not suitable for IDLH environments. They are tight fitting; may be powered or non-powered; and come with both half or full facepieces. The full facepiece provides additional protection for the face and eyes. Non-powered, half or full facepiece air purifying respirators are the most commonly used respirator protection at MRU. The filters, cartridges, or combination filter/cartridge used will depend on the identified hazards.

ATMOSPHERE SUPPLYING RESPIRATORS

Atmosphere Supplying Respirators supply clean air from a compressed air tank (Self Contained Breathing Apparatus – SCBA) or through a line that draws air in from a clean location outside the work area (Supplied Air Respirator – SAR). They are required in IDLH atmospheres, including those that are oxygen-deficient. SARs may be tight or loose fitting. Tight fitting respirators may have half or full facepieces and require fit testing. Loose-fitting respirators include hoods or helmets that cover the face and neck; they use positive pressure to supply clean air and do not require fit testing, so may be suitable for workers that cannot complete a fit test.

Atmosphere supplying respirators are not typically used by MRU employees; if they are needed for a task, training and information above that which is provided in this document will be required. Contact EH&S for further information.

ASSIGNED PROTECTION FACTORS

Each type of respiratory protection is assigned a number called a protection factor. The assigned protection factor (APF) reflects the degree of protection provided by the respirator when used correctly. The higher the APF, the stronger the protection and the higher the concentration of contaminant that the user can be exposed to without injury. A table of APFs can be found in Appendix D.

When assessing the correct level of respiratory protection required for non-bioaerosols, the APF should be compared to a hazard ratio, consisting of the airborne concentration of a contaminant divided by its 8 hour OEL. Select respirators with an APF higher than the value of the hazard ratio.

For bioaerosols, the APF is incorporated into the hazard assessment process outlined in Appendix B.

FILTER OR CARTRIDGE SELECTION

The type of filter or cartridge required will depend on the nature of the atmospheric hazard. Filters are designed to trap particles, while cartridges capture gases and vapours. Combination cartridge / filters are also available; they should be used when both hazards are present.

FILTERS

Filters are designed to trap particles such as dusts, fumes, mists, and aerosols (including bioaerosols) and come in three main categories, shown in the table below:

Oil Resistance		
N series	Not resistant to oil	May be used in any atmosphere where there is no oil particulate
R series	Resistant to oil	May be used for up to 8 hours of continuous or intermittent use in an atmosphere with oil particulate
P series	Oil proof	May be used for more than one shift in an atmosphere with oil particulate – consult manufacturer for service life information

There are three levels of filter efficiencies, tested against aerosol droplets of 0.3 □m diameter: 95, 99, and 100 (or HEPA), which protect against 95%, 99%, and 99.97% of particles, respectively.

Respiratory protection against particulates may consist of a filter attached to a half or full facepiece respirator, or fitted dust masks. A table of typical tasks performed at MRU and the appropriate filter for use is available in Appendix E: Common Respiratory Protection at MRU.

Filters should be replaced when it becomes difficult to breathe comfortably (indicating that the filter is clogging with particulate) or if the filter becomes dirty or physically damaged (which could reduce effectiveness). P-series filters should also be replaced within 40 hours of use or 30 days, whichever comes first (as the oil aerosols will start to affect the filter material). If there is any doubt about the efficacy or cleanliness of a filter, it should be replaced.

CARTRIDGES

Cartridges are designed to adsorb gases and vapours. The sorbent material is typically activated carbon, which may be treated with other chemicals to aid with adsorbing specific gases or vapours. Manufacturers classify their cartridges based on what materials will be adsorbed by the cartridge. Ensure that the selected cartridge is appropriate for the identified hazards, e.g. acid gases, organic vapour, and ammonia all require different cartridges. A table of cartridges commonly required for tasks at MRU is available in Appendix E: Common Respiratory Protection at MRU.

The service life of a cartridge will depend on the contaminant concentration, breathing rate of the user, humidity, temperature, and other use conditions. Cartridges should be replaced after 8 hours of use or within 30 days (whichever comes first), or sooner if indicated by a service life indicator on the cartridge or if the contaminant can be smelled or tasted when using the respirator.

MEDICAL SURVEILLANCE

Medical surveillance documentation shall be completed prior to fit testing and respirator use. Refer to Appendix F: Respiratory Health Screening Questionnaire.

The questionnaire identifies if the worker may have health conditions that would affect their ability to wear a respirator. If the worker answers “yes” to any of the three questions, further assessment by a health care professional is required to determine if the worker is fit to use a respirator.

The employer or employee will provide the following information to the health professional to aid them in their assessment of the physiological and psychological fitness of the worker:

- The work activity
- The workplace environment
- The type of respirator required

After medical surveillance is complete, the health professional should provide documentation indicating whether a worker meets the medical requirements to wear respiratory protective equipment, meets the requirements with limitations, or does not meet the medical requirements.

Documentation from the health professional shall be submitted to the MRU Human Resources (HR) Ability Management Consultant. All health information is confidential.

The HR representative shall communicate the result of the medical assessment to the EH&S team:

- If the employee is deemed fit to wear a respirator, the respirator fit test can proceed.
- If the employee is deemed unfit to wear a respirator, the fit test will not proceed. HR will communicate the restriction to the employee’s supervisor to determine if job accommodation is required.
- If the employee is deemed fit to wear a respirator with limitations, HR will discuss the limitations with the employee and communicate these to the employee’s supervisor to determine if job accommodations are required. If the Health Professional indicates that additional testing is required, HR will work with the employee to have it completed.

RESPIRATOR FIT TESTING

All fitted respirators must be fit tested to ensure they provide an effective seal and are comfortable for the user. EH&S provides qualitative and quantitative fit testing, depending on the type of respirator being tested.

Fit tests are required:

- Prior to the initial use of a respirator
- At least every two years
- Whenever there are changes to a user’s physical condition that might affect the respirator fit (e.g. weight gain / loss, facial surgery or scarring)
- Whenever there is a change to the type, make, model, or size of respirator

- When a user experiences significant discomfort during use of a respirator or cannot complete a successful seal check
- When other PPE is changed that could affect the fit of the respirator

Prior to the fit test, a potential user will review this program and complete a respiratory health screening questionnaire (available in Appendix F). Further information on the questionnaire and medical pre-screening process can be found in Medical Surveillance, above.

During the fit test, EH&S will verify the seal of the respirator, confirm a comfortable fit with the user, and ensure that the user can successfully don and doff the respirator and perform positive and negative pressure seal checks. The user must not eat, drink or smoke for about 20 minutes before the test.

Fit testing can only be performed on clean shaven workers, so that a proper seal can be established. If a worker is unable to be clean shaven, a loose-fitting respirator may need to be provided for the worker to complete the task safely; contact the worker's Supervisor and Human Resources to discuss accommodation requirements.

If the respirator will be worn with other PPE (e.g. safety glasses, hard hat, hearing protection) that may interfere with the respirator fit, the other PPE must be worn during the fit test.

QUALITATIVE FIT TESTING

Qualitative fit testing is a pass / fail method dependent on the user detecting a scent or taste. At MRU, qualitative fit testing is only used for filtering facepiece respirators (N95s) and uses either the saccharine (sweet tasting) or Bitrex (bitter tasting) spray. Safety Data Sheets for these substances are available through EH&S.

During the test, a fit chamber is placed over the users head. The tester releases the spray into the chamber and has the user perform actions that simulate movements typically made during work activities such as talking, bending, reaching, nodding, etc. If the wearer detects the test agent, the respirator must be re-adjusted or exchanged and the test repeated until no odours or tastes are detected. A properly administered qualitative fit test will take about 15-20 minutes to perform, assuming a perfect fit during the first attempt.

Qualitative fit testing is used at MRU for fitted dust masks only; half and full facepiece respirator fit testing is done using the quantitative method (below). A quantitative fit test should also be performed if workers are unable to smell or taste the saccharine or Bitrex spray when not wearing the respirator (which indicates that the fit test was inconclusive).

QUANTITATIVE FIT TESTING

Quantitative fit tests involve the measurement of respirator leakage by monitoring leakage inside the respirator facepiece with an instrument. Qualitative testing does not depend on the user's sense of smell or taste and tends to be more accurate than qualitative methods.

The instrument used at MRU is the Quantifit™ controlled negative pressure system, wherein pressure differences inside and outside the facepiece are measured once a controlled negative pressure is applied.

A description of the test protocol is provided in Appendix G.

TRAINING

Every worker that uses a respirator must be trained in the use and limitations of the respiratory protective equipment. This training shall be provided by the fit tester at the time of testing.

Training shall include instruction, demonstration, participant practice and demonstration of competency and shall be completed at least once every two years, when fit testing is completed. Training shall include:

- Review of this Respirator Program and Responsibilities
- Donning and doffing the respirator
- Performance of user seal checks (half and full facepiece respirators)
- Care, cleaning, storage, pre-use inspection, and operation of respirator
- Capabilities and limitations of the respirator
- Basic maintenance, including changing of filter / cartridge
- Use of log book to track respirator use and age / use of filter / cartridge
- Identification of problems and recognition of when the filter / cartridge shall be replaced
- How and when to remove from service
- Familiarity with and adherence to the manufacturer's instructions
- Additional training as required, based on manufacturer's instructions

The training program is evaluated annually to make sure it is effective.

RESPIRATOR USE, CARE, & MAINTENANCE

The information in this section shall be reviewed with users as part of the training program.

RESPIRATOR USE

The user shall have health screening, training and fit testing completed before using a respirator.

Users shall complete an inspection before each use of the respirator. Key elements to be inspected:

- Condition of all parts, including straps, connections, and facepieces
- Tightness of connections and condition of filters / cartridges
- Status of filter / cartridge, including hours in use and shelf-life of cartridge (use log book to track information)

If respirators do not pass inspection they are to be tagged and removed from service.

When using a respirator, ensure that nothing interferes with the seal of the respirator, such as eyewear or facial hair. A user seal check (positive and negative) shall be done every time a respirator is donned. Refer to Appendix H: User Seal Checks.

A change-out schedule should be established for the replacement of air-purifying filters or cartridges before their useful service life has ended and can include end-of-service-life indicators, maximum use time, and breathing resistance. The standard change-out schedule at MRU is noted below; this may not be appropriate for all activities, and should be adjusted as needed:

- Particulate filters should be replaced
  - If they become dirty, damaged, or unhygienic
  - When breathing becomes difficult, indicating that the filter is clogging with particulate
  - As per manufacturer's recommendations
  - In combination filter / cartridges with non-separable elements, the change-out schedule shall be based on the lesser service time of either element
- Cartridges should be replaced:
  - After 8 hours of use or within 30 days, whichever comes first (once a cartridge has been exposed to the air, it may be able to pick up contaminants that will exhaust the sorbent material)
  - Anytime the contaminant can be smelled or tasted when using the respirator, indicating that the sorbent material has been exhausted and will no longer provide protection
  - As per the end-of-life indicator (if the cartridge comes with one)
  - As per manufacturer's recommendations

Factors such as humidity, breathing rates, and levels of contaminants can affect the efficacy of filters or cartridges. If workers feel any of the following, they should leave the contaminated area and report the incident to their supervisor:

- Resistant or difficult breathing
- Unusual odour or taste (e.g. chemicals) within the respirator
- Nausea
- Dizziness
- Eye irritation (for full-face respirators)
- Excessive fatigue

RESPIRATOR CLEANING, MAINTENANCE, AND STORAGE

Respirators will be cleaned and sanitized, maintained, and stored as described by the manufacturer's instructions. If the respirators are not individually assigned, they must be cleaned and sanitized after each use.

The following procedure can be used to clean and sanitize most respirators:

- Remove filters and cartridges
- Wash the respirator (including mask, straps, hood, etc.) in warm water mixed with a mild detergent

- Rinse the respirator in clean, warm water
- Wipe the respirator with disinfectant wipes (70% isopropyl alcohol)
- Air dry away from sources of heat or light
- Reassemble the respirator

Dust mask respirators cannot be cleaned, and should be disposed of when they are damaged or no longer effective.

To maintain respiratory equipment, inspect the respirator for damage or deterioration after each use and clean and sterilize as per manufacturer's instructions. If the equipment is found to be defective, damaged, or malfunctioning, take the respirator out of service. Worn or damaged valves, straps, and other pieces may be replaced using manufacturer's specifications.

Respirators should be stored in a clean plastic bag when not in use, and kept in a clean, dry location away from sources of extreme temperature, sunlight, or damaging chemicals (including oils and greases). Store respirators so they are not flattened or compressed, which could change the shape of the respirator and affect the fit.

DEFINITIONS

Air Purifying Respirator: A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Atmosphere Supplying Respirator: A respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere. Includes Supplied Air Respirators (SARs) and Self-Contained Breathing Apparatus (SCBA) units.

Bioaerosol: A tiny, airborne particle (such as a fungal spore, pollen grain, endotoxin, or particle of animal dander) that is composed of or derived from biological matter. Bioaerosols can produce significant health effects by spreading infectious disease or triggering allergic responses or respiratory irritation.

Cartridge: A container of adsorbing material used in an air purifying respirator to remove hazardous gases and vapours from the air. The sorbent material attracts and captures pollutants as the air passes through the cartridge. Cartridges are classified based on the type(s) of gases or vapours that will be adsorbed.

Contractor: A worker performing work on University property while being employed by another organization.

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.

Employees: Volunteers or individuals who are engaged to work for the University under an employment or apprenticeship contract, including Faculty, Staff, exempt Employees, Management Employees, and Undergraduate, Graduate or Postgraduate students carrying out work for the University.

Filter: A porous material used in an air purifying respirator that is designed to capture particles such as dusts, fumes, mists, and aerosols (including bioaerosols). They come in three main categories: N (not resistant to oil), R (moderately resistant to oil), P (oil proof). They are available in three main efficiency ratings: 95, 99, and 100 (or HEPA), which remove 95%, 99%, and 99.97% of particles, respectively.

Fit Test: The procedure completed to qualitatively or quantitatively evaluate the fit of a respirator on an individual.

Hazard: A situation, condition, or thing that may be dangerous to the safety or health of workers or the environment.

Hazard Assessment: A written problem solving tool used to recognize existing and potential hazards at work before they cause harm to people or property. It includes a task outline, associated hazards of the task, risk analysis, and hazard controls for the associated hazards.

HEPA Filter: High Efficiency Particulate Air Filter. HEPA filters are used in both respirators and air handling equipment. The filters have a minimum particulate removal efficiency of 99.97 per cent for thermally generated mono-dispersed DOP aerosol particles with a diameter of 0.3 micrometers and a maximum pressure drop of 1.0 inch water gauge when lean and operating at their rated airflow capacity.

Immediately Dangerous to Life and 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.

Medical Accommodation: Adjustments to an employer's standards, rules, policies, culture, and environment to accommodate a worker who might be negatively affected by a medical limitation. Under the Alberta Human Rights Act, employees have a legal duty to take reasonable steps to accommodate individual needs to the point of undue hardship.

Occupational Exposure Limit (OEL): The maximum airborne concentration of a toxic substance to which a worker can be exposed over a period of time without suffering any harmful consequences. In Alberta, the OHS Code Schedule 1 outlines the 8-hour and 15-minute or ceiling OELs.

Protection Factor: The workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program.

Qualitative Fit Test: 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: An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

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

Student: Any individual who maintains an affiliation as a learner in the University educational community. Students are not workers, but receive credits, grades and fulfills tasks as a requirement of graduation. Work experience and Co-op students are treated as “workers”.

Supplied-Air Respirator (SAR): An atmosphere-supplying respirator that provides uncontaminated air for the user along a line connected to an ambient pump (an air compressor designed specifically for respiratory protection applications) located in, or drawing air from, a clean environment.

User Seal Check: An action conducted by the respirator user to determine if the respirator is properly seated to the face.

REFERENCES

Alberta Occupational Health and Safety Act, Regulation and Code, http://work.alberta.ca/occupational-health-safety/ohs-act-regulation-and-code.html

Development of a Code of Practice for Respiratory Protective Equipment, PPE004, Alberta Government, https://open.alberta.ca/publications/ppe004-respiratory-protective-equipment

Respiratory Protective Equipment: An Employer’s Guide, PPE001, WorkSafe Alberta Occupational Health and Safety Bulletin, https://open.alberta.ca/publications/ppe001-breathing-apparatus

Canadian Centre for Occupational Health and Safety
https://www.ccohs.ca/oshanswers/prevention/ppe/respslct.html

Canadian Standards Association (CSA) Standard Z94.4 Selection, Use and Care of Respirators.

National Institute for Occupational Safety and Health. NIOSH Guide to the Selection and Use of Particulate Respirators. Publication no.96-101 NIOSH, Cincinnati, Ohio. 1996.

Quantifit™ User’s Manual – Respirator Fit Tester and Software

REVISION HISTORY

Date	Revision	Notes
October 2019	01	Creation of Safe Work Program

APPENDICES

APPENDIX A: HAZARD ASSESSMENT AND RESPIRATOR SELECTION – NON-BIOAEROSOLS

When evaluating non-bioaerosol hazards, the following aspects must be considered:

- Nature of the contaminant
  - Consider operations or processes that could produce contaminants, all materials used and disposed of, and the work area environment (temperature, humidity, etc.)
- Physical state of the contaminant
  - Particulates, gases, vapours
- Concentration or likely concentration of the contaminant, and highest short-term concentrations likely to be encountered
  - Determined through air sampling, or through comparison with similar job tasks / work spaces
- Concentration of oxygen in the work area
- Occupational Exposure Limit (OEL) for each contaminant
- Potential for Immediately Dangerous to Life and Health (IDLH) atmospheres
- Additional health regulation of substance specific standard for the contaminants
  - E.g. is the contaminant listed in Schedule 1, Table 1 of the Alberta OHS Code?
- Presence of oil in the workplace that could become airborne
- If the contaminant can be absorbed through or cause irritation to skin or eyes

Complete the table provided on the following page prior to work start; if there are any questions, contact EH&S.

Table A-1: Hazard Assessment and Respirator Selection – Non-Bioaerosols

To be completed by supervisor and/or worker prior to work start.

Job Task and Location:	
Worker Activity Level (Low, Medium, High):	
What actual or potential atmospheric hazards are present:	
Physical state (particulate and/or gas/vapour) and expected concentration(s)?	
What is the OEL for the contaminant(s)?	
Is this an IDLH environment? (IDLH concentration or oxygen < 19.5%)	
Is there an SDS or Regulation to be followed for the contaminant(s)?	
Is there a risk of oily particulate?	
Can the contaminant irritate or be absorbed through the skin or eyes?	
What are the contaminant warning properties?	
Is emergency escape potentially needed?	
What is the toxicity of the contaminant?	
What Minimum Protection Factor is needed? (See Appendix D)	
What Engineering and/or Administrative controls are in place?	
Anticipated respirator use time (in hours)?	
Any other PPE required?	

Respirator Selection – to be completed by EH&S after the hazard assessment is complete:

Hazard Ratio = Airborne Concentration ÷ OEL Hazard Ratio= _____

Type of Respirator Needed _____

Type of Cartridge/Filter Needed _____

APPENDIX B: HAZARD ASSESSMENT AND RESPIRATOR SELECTION – BIOAEROSOLS

Selecting the appropriate respiratory protection required for bioaerosols is determined by:

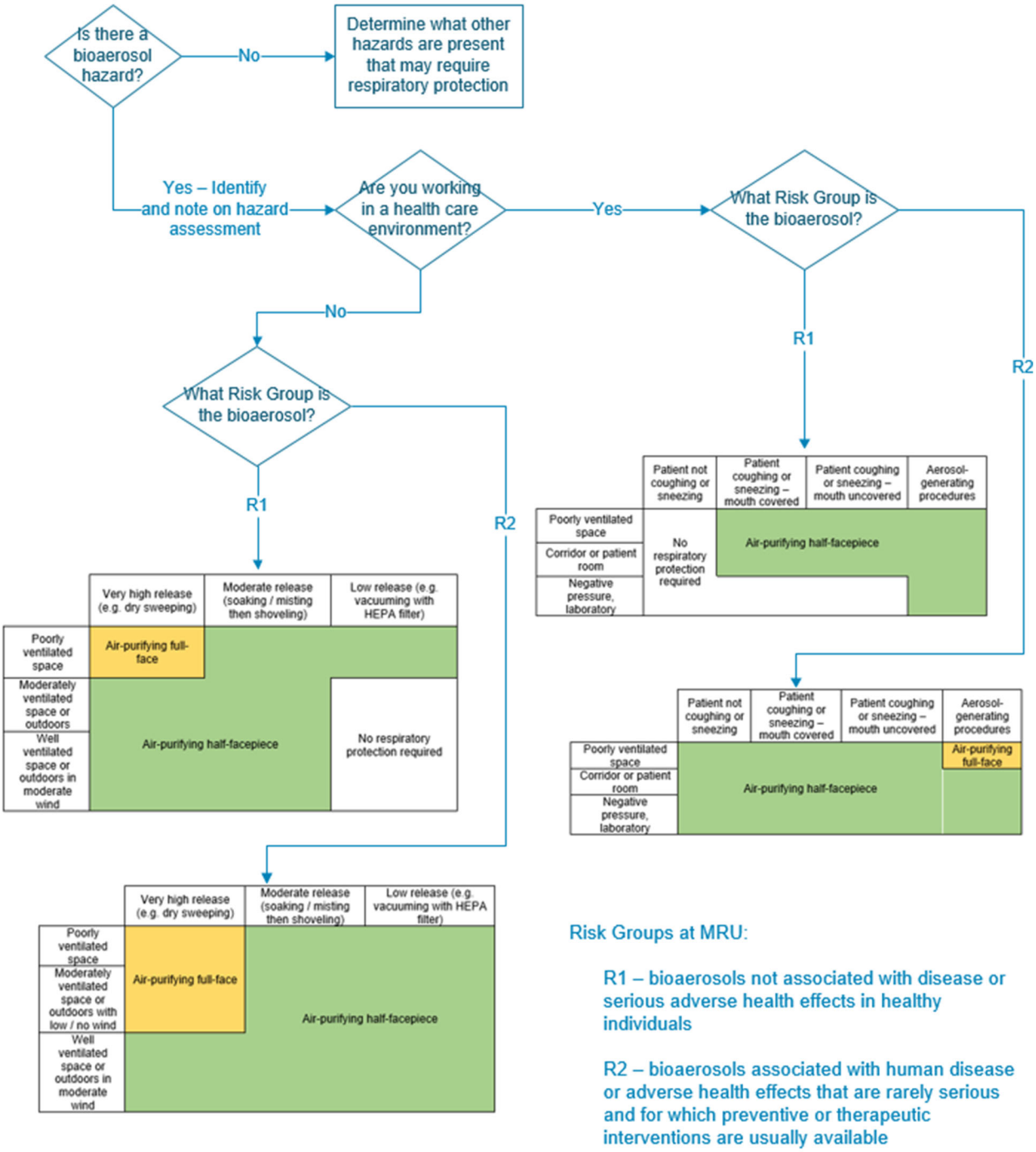
- Identifying the bioaerosol
- Performing a risk assessment to determine the risk of adverse health effects produced by inhalation of the bioaerosol
- Select appropriate respiratory protection

The **risk group** is defined by the nature of the bioaerosol / pathogen. At Mount Royal University, there are two risk groups:

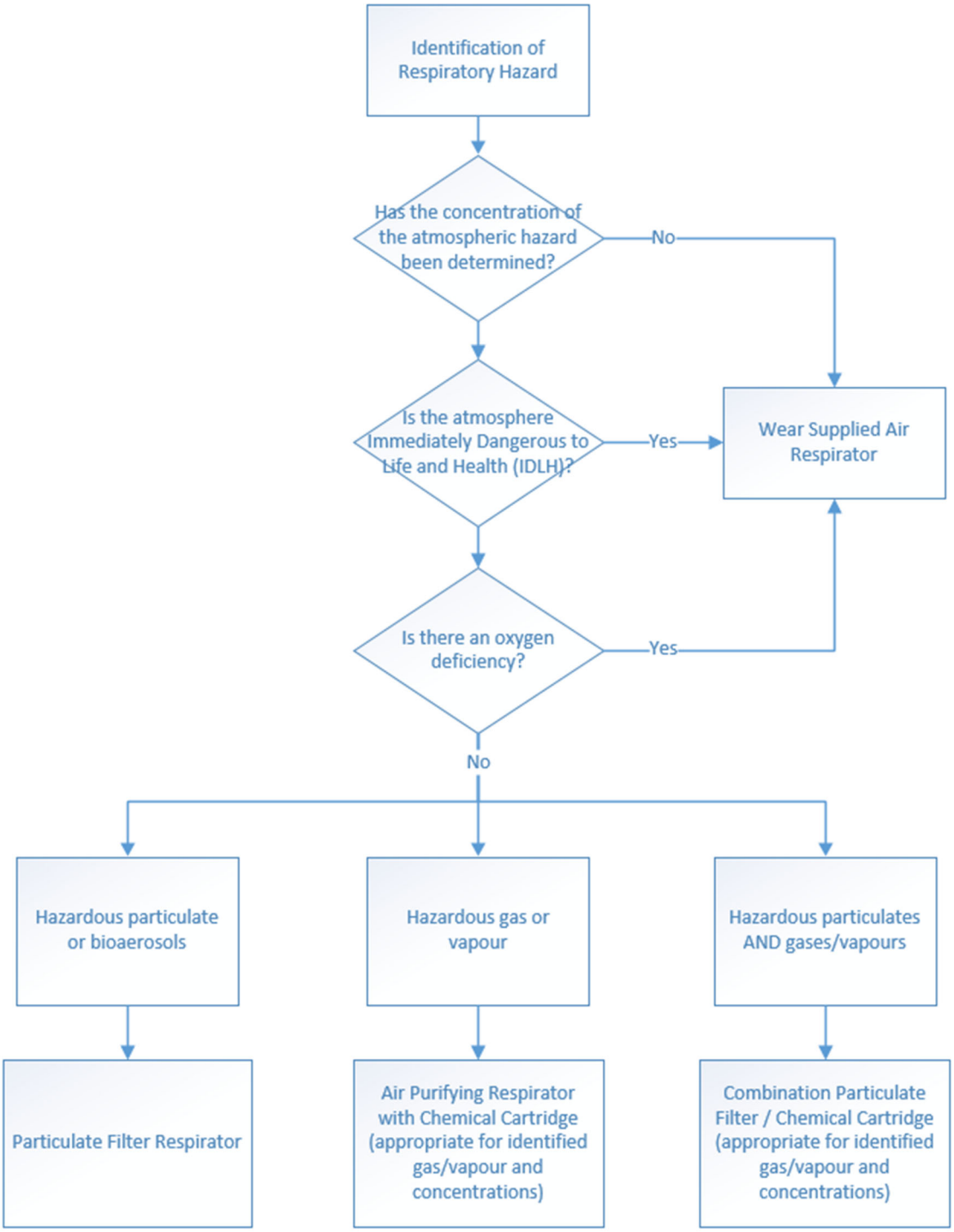
- Risk group 1 (R1) – Agents not associated with disease or serious adverse health effects in healthy individuals
- Risk group 2 (R2) – Agents associated with human disease or adverse health effects that are rarely serious and for which preventive or therapeutic interventions are usually available

To determine the appropriate level of respiratory protection for bioaerosols:

- Consult the flowchart below
- Note the identified bioaerosol and required respiratory protection on the hazard assessment.


Is there a bioaerosol hazard?
No
Determine what other hazards are present that may require respiratory protection
Yes – Identify and note on hazard assessment
Are you working in a health care environment?
Yes
No
What Risk Group is the bioaerosol?
What Risk Group is the bioaerosol?
R1
R2
R1
R2
Patient not coughing or sneezing
Patient coughing or sneezing – mouth covered
Patient coughing or sneezing – mouth uncovered
Aerosol-generating procedures
Poorly ventilated space
Corridor or patient room
Negative pressure, laboratory
No respiratory protection required
Air-purifying half-facepiece
Very high release (e.g. dry sweeping)
Moderate release (soaking / misting then shoveling)
Low release (e.g. vacuuming with HEPA filter)
Poorly ventilated space
Moderately ventilated space or outdoors
Well ventilated space or outdoors in moderate wind
Air-purifying full-face
Air-purifying half-facepiece
No respiratory protection required
Moderately ventilated space or outdoors with low / no wind
Air-purifying full-face
Air-purifying half-facepiece
Risk Groups at MRU:
R1 – bioaerosols not associated with disease or serious adverse health effects in healthy individuals
R2 – bioaerosols associated with human disease or adverse health effects that are rarely serious and for which preventive or therapeutic interventions are usually available

APPENDIX C: RESPIRATOR SELECTION FLOWCHART



APPENDIX D: ASSIGNED PROTECTION FACTORS

The assigned protection factor of a respirator relates to the level of protection it supplies when used correctly.

When assessing the correct level of respiratory protection required, the APF should be compared to a hazard ratio, consisting of the airborne concentration of a contaminant divided by its 8 hour OEL. Select respirators with an APF higher than the value of the hazard ratio.

Table D-1: Assigned Protection Factors, by Respirator Type

Respirator type	Protection factor
Air-purifying respirators	
Non-powered air-purifying	
Half-facepiece	10
Full-facepiece	50
Powered air-purifying	
Loose-fitting facepiece PAPR	25
Full-facepiece PAPR equipped with "100" (HEPA) filters for exposure to asbestos	100
Full-facepiece PAPR or helmet/hood PAPR for exposure to contaminants other than asbestos	1,000
Hood/helmet	
Hood/helmet PAPR	25
Hood/helmet PAPR (manufacturer has tested the respirator and demonstrated a protection factor of at least 1,000)	1,000
Air-supplying respirators	
Airline – demand (negative pressure)	
Half-facepiece	10
Full-facepiece	50
Airline – continuous flow	
Loose-fitting facepiece	25
Half-facepiece	50
Full-facepiece	1,000
Helmet/hood	1,000
Airline – pressure-demand (positive pressure)	
Half-facepiece	50
Full-facepiece	1,000
Full-facepiece, with egress (escape) bottle	10,000
Self-contained breathing apparatus (SCBA)	
Demand (negative pressure)	50
Pressure-demand (positive pressure)	10,000
Note: Protection factors do not apply to escape respirators.	

APPENDIX E: COMMON RESPIRATORY PROTECTION AT MRU

The table below outlines some of the typical tasks performed at MRU, along with the potential atmospheric hazards that may be encountered and the recommended respiratory protection to be used.

THE LIST BELOW IS NOT COMPREHENSIVE AND DOES NOT REPLACE A PRE-JOB HAZARD ASSESSMENT.

There may be unlisted tasks that require respiratory protection, the hazards present when performing a task might vary, and the minimum respiratory protection listed may not be suitable for every situation. If your task is not listed, you believe that other atmospheric hazards may be present, or you are unsure if the suggested respiratory protection is adequate for your situation, contact your Supervisor or EHS.

Lastly, remember that personal protective equipment (PPE), including respiratory protection, is a last line of defense. Whenever possible, engineering controls (such as mechanical ventilation) and administrative controls (such as procedures, practices, and work/rest periods) should be implemented before resorting to PPE.

The respiratory protection listed below assumes the application of engineering and administrative controls as well, such as procedures for minimizing exposure. If these controls are not able to be applied, higher levels of respiratory protection may be required – contact supervisor or EH&S for assistance.

Task	Potential Atmospheric Hazards	Suggested Minimum Respiratory Protection[1]
Cutting rocks in rock lab	Rock / silica dust	Disposable dust mask: N95, N99, or N100
Cutting wood, carpentry	Wood Dust	Disposable dust mask: N95, N99, or N100
Welding, brazing	Fumes, including metallic oxides, fluorides and silicates	Fitted half-face mask with P100 filter (ensure the mask works with the welding helmet if required)
Spray painting, varnishing	Paint mists, organic vapours	Fitted half-face mask with combination P100 filter and organic cartridge
Plumbing	Dust, biohazards	Disposable N100 dust mask or fitted half-face mask with N100 filter
Cutting drywall, concrete, or other surfaces	Dust, including silica dust[2]	Disposable dust mask: N95, N99, or N100
Working with pesticides or herbicides	Organic vapours	Fitted half-face mask with organic vapour cartridge (refer to SDS to confirm cartridge type)

Task	Potential Atmospheric Hazards	Suggested Minimum Respiratory Protection[1]
Cleaning animal droppings or carcasses	Biohazards, including hanta virus	Disposable N100 dust mask or fitted half-face mask with N100 filter
Solution preparation for swimming pool	Acidic gas (HCl)	Fitted half-face mask with acid gas cartridge
Working with hazardous chemicals in fume hood or biological hazards in biosafety cabinet	Fumes, vapours, biohazards	No respiratory protection required, provided materials are kept within appropriate enclosure
Cleaning chemical and hazardous material spills	Fumes, vapours, biohazards	Will depend on the material being cleaned up – consult with EH&S and workers from the area to determine appropriate protection

[1]Particulate filters and dust masks come in three main categories: N (not resistant to oil), R (moderately resistant to oil), P (oil proof); and three main efficiency ratings: 95, 99, and 100 (or HEPA), which remove 95%, 99%, and 99.97% of particles, respectively. The code is noted directly on the filter.

[2]If there is a risk of asbestos exposure, additional measures apply. Consult the MRU Asbestos Management Program for additional information.

CARTRIDGE SELECTION TABLE

The cartridge required will depend on the types of atmospheric gases or vapours present. Different manufacturers may use different colour coding schemes; consult manufacturer's information when selecting chemical cartridges.

Table E-1: 3M Brand Chemical Cartridge Chart

6001	Organic Vapor	Black
6002	Acid Gases	White
6003	Organic Vapor/Acid Gases	Yellow
6004	Ammonia/Methylamine	Green
6005	Formaldehyde/Organic Vapor	Olive/Black
6006	Multi-Gas/Vapor	Olive
6009	Mercury Vapor/Chlorine Gas	Orange

APPENDIX F: RESPIRATORY HEALTH SCREENING QUESTIONNAIRE

A sample copy is below; refer to Forms on the EH&S website for the most current Respiratory Health Screening Questionnaire document.

Mount Royal University: Environmental Health & Safety Documentation		
Respiratory Health Screening Questionnaire		
Rev: 01	Date: January 2019	Page: 1 of 1

Complete this questionnaire before completing a respiratory fit test. If you answer "yes" to any of the questions below, further assessment is required; contact EH&S for next steps.

Worker Information:

First Name:	Last Name:
Email:	Contact Number:
Department:	Job Title:
Date:	Supervisor Name:
Supervisor Phone:	Supervisor Email:

Respirator User's Health Condition Questionnaire:

Check Yes or No box only. Do NOT specify medical information on this form.

Some conditions can seriously affect your ability to safely use a respirator. Do you have or have you experienced any condition that could affect respirator use? (e.g. asthma, emphysema, claustrophobia, pacemaker)	☐ Yes ☐ No
Have you had previous difficulty while using a respirator?	☐ Yes ☐ No
Do you have any concerns about your future ability to use a respirator safely?	☐ Yes ☐ No

*A **YES** answer to **any of the above questions** indicates further assessment by a health care professional is required prior to respirator use.*

If the respirator to be used is a powered air respirator, ensure further assessment and training is completed.

I have answered the questions truthfully, to the best of my ability and knowledge, and agree that if there are any changes to my health or body that may cause difficulties wearing a respirator I will let my supervisor know and contact EH&S for a reassessment.

I have reviewed the MRU Respiratory Protection Program and understand my responsibilities under the program.

I consent to allow HR to send information needed to EH&S about my fitness regarding my ability to wear a respirator.

Name:	Date:
Signature:	

APPENDIX G: QUANTITATIVE RESPIRATORY FIT TESTING PROTOCOL – QUANTIFIT™

A summary of the test protocol is presented below. Consult the Quantifit™ user manual for the full protocol and additional information.

The Quantifit™ respirator fit tester and software is used at MRU to complete quantitative fit testing on half and full face respirator masks.

The user should be outfitted in the mask they will be wearing in the workplace. If they have not worn the respirator before, have them perform a user seal check prior to the fit test, to ensure that the mask selected is likely to be a good fit. If they are retesting a currently assigned respirator, the seal check is not needed.

Open the inhalation valves by removing the rubber gaskets, attach the test adapters to the mask inlets, and have the user don the mask.

Once the mask is properly positioned, the user will proceed through the five step test protocol. For each step, the user will take a breath, hold the breath, and press the trigger button to close the adapter valve and start the test. The user shall continue to hold their breath and the button until the software indicates that the step is completed (less than 8 seconds).

The steps are as follows:

1. Face Forward – user holds breath while keeping face forward in neutral position
2. Bend Over – user holds breath while bending over to look at their feet
3. Shake Head – user shakes and turns head, then holds breath while keeping face forward
4. Redon Respirator – user removes and re-dons respirator, then holds breath while keeping face forward
5. Redon Respirator – user repeats step 4

If a user must be fit tested for an SCBA respirator, a different protocol should be used. Consult the manual for more information.

APPENDIX H: USER SEAL CHECK PROCEDURE

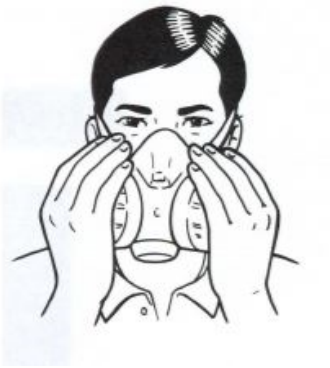
User seal checks are required each time a respirator is donned, and before a fit test is performed. User seal checks are not substitutes for fit testing; they are a way to ensure that an adequate seal is achieved each time the respirator is put on.

Negative pressure seal check

The negative pressure seal check is done by closing off or blocking the inlet opening(s) of the air purifying elements of the respirator so that when the user inhales, no air will flow into the facepiece. The user then gently inhales and holds their breath for at least 5 seconds. The face piece should collapse slightly on the face and remain collapsed while the breath is being held. If this occurs, the test is successful.

If not, the user must verify the seal of the respirator to the face and adjust the facepiece and harness and repeat the test. If the test cannot be successfully completed, the user should check the respirator facepiece components for leakage or use a different brand/size of respirator.

Figure 1 Negative pressure fit check



Positive pressure seal check

The positive pressure seal check is done by closing off or blocking the exhalation valve or breathing tube, or both, of the respirator so that no air will flow out of the facepiece. The wearer exhales gently, holds their breath, and checks for a slight positive pressure in the facepiece. If no air leaks from the facepiece while positive pressure is maintained, the test is successful.

If air leaks, the seal of the facepiece must be checked, the harness adjusted, and the test must be repeated. Again, if the user is not able to successfully complete this test, another type/style/size of respirator should be tried.

Figure 2 Positive pressure fit check

Seal checks for disposable respirators

For disposable respirators, the user seal checks are done somewhat differently.

- For non-valve disposable respirators, both hands must be placed completely over the respirator while the wearer exhales. The respirator should bulge slightly.
- For disposable respirators that have a valve, both hands should be placed over the respirator and the user inhales sharply. The respirator should collapse slightly.

If air leaks at the edges of the respirator, it should be re-positioned and adjusted for a more secure fit and the test repeated. If the seal check cannot be successfully completed, another type/style/size of respirator should be tried.

Figure 3 Positive pressure user seal check – Disposable filtering facepiece respirator