

Respiratory Protection Program

**Safety & Security Services
September, 2003**



DEFINITIONS

Aerosol -- a dispersion of solid or liquid particles in a gaseous medium.

Assigned Protection Factor (APF) – a measure of the minimum anticipated workplace level of respiratory protection that would be provided by a properly functioning respirator or class of respirators to a percentage of properly fitted and trained users.

Biological Monitoring -- a measurement of the extent to which an individual has been exposed to a contaminant by analysis of exhaled air, a biological fluid (e.g., urine, blood, perspiration), or a body component (e.g., hair, nails).

Confined Space -- as defined by the regulatory authority. Examples include: storage tanks, process vessels, boilers, silos, tank cars, pipelines, tubes, ducts, sewers, underground utility vaults, tunnels, and pits. All confined spaces are considered IDLH unless proven otherwise.

Controlled Breathing -- a method of consciously reducing air used by forcing exhalation from the mouth and allowing natural inhalation through the nose.

Dangerous Work Area -- any worksite where potentially dangerous levels of air contamination or oxygen deficiency cannot be prevented or eliminated.

Dust -- solid, mechanically produced particles or fibers.

Exposure Limit (EL) -- a permissible exposure limit to airborne contaminants as defined by the regulatory authority.

Face Piece -- that portion of a respirator which covers the wearer's nose and mouth in a quarter-mask (above the chin) or half-mask (under the chin) face piece, or which covers the nose, mouth, and eyes in a full face piece. It is designed to make a seal with the face and may include the head harness, exhalation valve(s), and connections for an air-purifying device or a respirable gas source or both.

Fume -- solid particles generated by condensation from the gaseous state, generally after volatilization from melted substances (e.g., welding) and often accompanied by a chemical reaction, such as oxidation.

Gas -- a substance that is in the gaseous state at ambient temperature and pressure.

Hazardous Atmosphere – any atmosphere that is oxygen-deficient or that contains an airborne toxic or disease-producing contaminant in concentrations exceeding the exposure limit.

High-Efficiency Particulate Air Filter (HEPA) -- a filter that has been tested to assure an efficiency equal to or exceeding 99.97% for removal of particles having a mean aerodynamic diameter of 0.3 µm from the air.

Hydrostatic Test -- a test of the structural integrity of breathing-gas cylinders.

Immediately Dangerous To Life Or Health (IDLH) -- a condition in any worksite, space, or area where a hazardous atmosphere exists to such an extent that a person without appropriate respiratory protection could be fatally injured or suffer immediate, irreversible, or incapacitating health effects (see Clauses 5.2 and 6.3.2.6).

Intrinsically Safe -- where any spark or thermal effect that may occur in normal use, or under any conditions of fault likely to occur in practice, is incapable of causing an ignition of the prescribed flammable gas, vapour, or dust.

Lower Explosive Limit (LEL) -- the lower limit of flammability of gas, vapour, or dust or any combination of these at ambient temperatures. For gases and vapours, this is expressed as a percentage in air by volume. For dusts, this is expressed as weight of dust per volume of air.

Mist -- liquid particles in a gaseous medium.

Oxygen Deficiency -- as defined by the regulatory authority for physiological effects. For certain respirators, refer to the minimum oxygen concentration where such devices may be utilized.

Particulate -- includes airborne dust, fumes, or mist.

Program Administrator -- a qualified person who is responsible and accountable for the development, implementation, and administration of the respiratory protection program.

Protection Factor -- a quantitative measure of the fit of a particular respirator to a particular individual.

Qualified Person -- (a) as defined by the regulatory authority; or, (b) a person who, because of their knowledge, training, qualifications, or experience, is competent to perform the duties of their job.

Qualitative Fitting Test (QLFT) -- a fitting test whereby the person wearing a respirator is exposed to an irritant smoke, an odorous vapour, or another suitable test agent. The respirator wearer uses his or her senses to detect any leakage of the test agent into the face piece.

Quantitative Fitting Test (QNFT) -- a fitting test using instrumentation that quantifies the actual protection factor provided to the person by the respirator.

Regulatory Authority -- an agency, established by a provincial, federal, or territorial government, that has the authority to make or enforce, or both, regulations regarding occupational health and safety.

Respirator -- a device designed to protect the wearer from inhaling a hazardous atmosphere.

Sanitization -- removal of dirt and agents that may cause infection or disease.

Service Life -- the period of time during which a respirator provides adequate protection to the wearer.

Smoke -- aerosols, gases, and vapours resulting from incomplete combustion.

Sorbent -- a material contained in air-purifying respirators that removes toxic gases and vapours from the inhaled air.

Supplied-air suit -- a suit that is impermeable to most particulate and gaseous contaminants and is provided with an adequate supply of respirable air in order to maintain a positive pressure inside the suit.

Vapour -- the gaseous state of a substance that is solid or liquid at ambient temperature and pressure.

RESPONSIBILITIES

Program Administrator

- review sanitation/storage procedures.
- ensure respirators are properly, stored, inspected and maintained.
- monitor compliance with this program.
- ensure training for affected Employees.
- review compliance and ensure monthly inspection of all respirators.
- provide respirator fit testing.

Managers/Supervisors

- Implement the requirements of this program
- Supervisors will ensure each employee under his or her supervision using a respirator has received appropriate training in its use and an annual medical evaluation.
- Provide a selection of respirators as required
- Supervisors will ensure the availability of appropriate respirators and accessories, provide adequate storage facilities, and ensure proper respirator equipment maintenance.
- Supervisors must be aware of tasks requiring the use of respiratory protection, and ensure all employees engaged in such work use the appropriate respirators at all times.
- Enforce all provisions of this program

Respirator Wearers

- To wear his/her respirator when and where required and in the manner in which they were trained It is the responsibility of each respirator wearer.
- Respirator wearers must report any malfunctions of the respirator to his/her supervisor immediately.
- The respirator wearer must also guard against mechanical damage to the respirator, clean the respirator as instructed, and store the respirator in a clean, sanitary location.

Contractors

- Contractors, who must enter into or work in areas where exposure to hazardous materials cannot be controlled or avoided, are required to follow the Algonquin College respiratory protection program or alternate procedures which afford workers the same level or a greater level of protection, as determined by the OHS section.

Others

- Public, visitors and volunteers who are not medically qualified to wear a respirator and have proper fit testing records, must not enter an area where the use of respiratory protective equipment is required.

TYPES OF RESPIRATORS

A. Air-Purifying Respirator

These respirators remove air contaminants by filtering, absorbing, adsorbing, or chemical reaction with the contaminants as they pass through the respirator canister or cartridge. This respirator is to be used only where adequate oxygen (19.5 to 23.5 percent by volume) is available. Air-purifying respirators can be classified as follows:

1. Particulate removing respirators, which filter out dusts, fibers, fumes and mists. These respirators may be single-use disposable respirators or respirators with replaceable filters.

NOTE: Surgical masks do not provide protection against air contaminants. They are never to be used in place of an air-purifying respirator. They are for medical use only.

2. Gas- and vapor-removing respirators, which remove specific individual contaminants or a combination of contaminants by absorption, adsorption or by chemical reaction. Gas masks and chemical-cartridge respirators are examples of gas- and vapor-removing respirators.
3. Combination particulate/gas- and vapor-removing respirators, which combine the respirator characteristics of both kinds of air-purifying respirators.

B. Supplied-Air Respirators

These respirators provide breathing air independent of the environment. Such respirators are to be used when the contaminant has insufficient odor, taste or irritating warning properties, or when the contaminant is of such high concentration or toxicity that an air-purifying respirator is inadequate. Supplied- air respirators, also called airline respirators, are classified as follows:

1. Demand

This respirator supplies air to the user on demand (inhalation), which creates a negative pressure within the facepiece. Leakage into the facepiece may occur if there is a poor seal between the respirator and the user's face.

2. Pressure-Demand

This respirator maintains a continuous positive pressure within the facepiece, thus preventing leakage into the facepiece.

3. Continuous Flow

This respirator maintains a continuous flow of air through the facepiece and prevents leakage into the facepiece.

C. Self-Contained Breathing Apparatus (SCBA)

This type of respirator allows the user complete independence from a fixed source of air and offers the greatest degree of protection but is also the most complex. Training and practice in its use and maintenance is essential. This type of device will be used in emergency situations only.

RESPIRATOR SELECTION

Selection of the proper respirator(s) to be used in any work area or operation at Algonquin College is made only after a determination has been made as to the real and/or potential exposure of employees to harmful concentrations of contaminants in the workplace atmosphere. This evaluation will be performed prior to the start of any routine or non-routine tasks requiring respirators. OHS, using CSA-Z94.4-93, and NIOSH, will select respiratory protective devices. The following items will be considered in the selection of respirators:

- Effectiveness of the device against the substance of concern;
- Estimated maximum concentration of the substance in the work area;
- General environment (open shop or confined space, etc.);
- Known limitations of the respiratory protective device;
- Comfort, fit, and worker acceptance; and
- Other contaminants in the environment or potential for oxygen deficiency.

Supervisors shall contact OHS prior to non-routine work which may expose workers to hazardous substances or oxygen deficient atmospheres. Examples of work which may require the use of respirators includes, but is not limited to the following:

- Asbestos abatement activities
- Abrasive blasting
- Cutting or melting lead or stripping lead-based paints from surfaces
- Welding or burning
- Painting, especially with epoxy or organic solvent coatings
- Automotive spray painting
- Using solvents, thinners, or degreasers
- Any work which generates large amounts of dust
- Working in a confined space
- Using formaldehyde to decontaminate a space
- Bioaerosols
- Fluorescent light tubes disposal

A review of the real and/or potential exposures is made at least annually to determine if respiratory protection continues to be required, and if so, do the previously chosen respirators still provide adequate protection.

Respirators For Immediately Dangerous to Life or Health (IDLH) Atmospheres

The following respirators are required in IDLH atmospheres:

- A full face piece pressure demand SCBA certified by NIOSH for a minimum service life of thirty minutes, or
- A combination full face piece pressure demand supplied-air respirator (SAR) with auxiliary self-contained air supply.
- Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

Respirators For Non-IDLH Atmospheres

- The respirators selected shall be adequate to protect the health of the employee and ensure compliance with all other Occupational Health & Safety regulatory requirements, under routine and reasonably foreseeable emergency situations. The respirator selected shall be appropriate for the chemical state and physical form of the contaminant.

Respirator Selection And Use

HAZARD	RESPIRATOR TYPE
Asbestos	Half-mask, air-purifying respirator with HEPA filters Full-face, air-purifying respirator with HEPA filters Full-face, powered air-purifying respirator with HEPA filters
Epoxy- or Oil-based Paints	Half-face, air-purifying respirators with organic vapor filters Full-face powered air-purifying respirator with organic vapor filters
Lead-based Paint removal	Half-face, air-purifying respirators with HEPA filters Full-face, air-purifying respirators with HEPA filters Full-face, powered air-purifying respirators with HEPA filters
Use of Pesticides, Herbicides, and Rodenticides	Full-face, air-purifying respirator with combination particulate and pesticide cartridges Full-face, powered air-purifying respirator with combination particulate and pesticide cartridges
Use of Formaldehyde	Full-face, air-purifying respirator with organic vapor or specific formaldehyde cartridges Full-face, powered air-purifying respirator with organic vapor or specific formaldehyde cartridges Type C supplied air respirator with pressure- demand mode

Identification of Respirator Cartridges and Gas Mask Canisters

Respirator cartridges and canisters are designed to protect against individual or a combination of potentially hazardous atmospheric contaminants, and are specifically labeled and color-coded to indicate the type and nature of protection they provide.

The NIOSH approval label on the respirator will also specify the maximum concentration of contaminant(s) for which the cartridge or canister is approved. For example, a label may read:

- ***Do not wear in atmospheres that are IDLH***
- ***Must be used in areas containing at least 20% oxygen***
- ***Do not wear in atmospheres containing more than .1% organic vapours by volume***
- ***Refer to complete label on respirator or cartridge container for assembly, maintenance and use***

Filter Classifications - These classifications are marked on the filter or filter package

N-Series: Not Oil Resistant

- Approved for non-oil particulate contaminants
- Examples: dust, fumes, mists not containing oil

R-Series: Oil Resistant

- Approved for all particulate contaminants, including those containing oil
- Examples: dusts, mists, fumes
- Time restriction of 8 hours when oils are present

P-Series: Oil Proof

- Approved for all particulate contaminants including those containing oil
- Examples: dust, fumes, mists
- See Manufacturer's time use restrictions on packaging

Respirator Filter & Canister Replacement

An important part of the Respiratory Protection Program includes identifying the useful life of canisters and filters used on air-purifying respirators. Each filter and canister shall be equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant; or

If there is no ESLI appropriate for conditions a change schedule for canisters and cartridges that is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life.

Filter & Cartridge Change Schedule

Stock of spare filters and cartridges shall be maintained to allow immediate change when required.

Cartridges Shall Be Changed Based On The Most Limiting Factor Below:

- Prior to expiration date
- Manufacturer's recommendations for the specific use and environment
- After each use
- When requested by employee
- When contaminate odor is detected
- When restriction to air flow has occurred as evidenced by increase effort by user to breathe normally
- Cartridges shall remain in their original sealed packages until needed for immediate use

Filters Shall Be Changed Based On The Most Limiting Factor Below:

- Prior to expiration date
- Manufactures recommendations for the specific use and environment
- When requested by employee
- When contaminate odor is detected
- When restriction to air flow has occurred as evidenced by increase effort by user to breathe normally
- When discoloring of the filter media is evident
- Filters shall remain in their original sealed package until needed for immediate use.

WARNING SIGNS OF RESPIRATOR FAILURE**A. Particulate Air-Purifying**

When breathing difficulty is encountered with a filter respirator (due to partial clogging with increased resistance), the filter(s) must be replaced. Disposable filter respirators must be discarded.

B. Gas Or Vapor Air-Purifying

If, when using a gas or vapor respirator (chemical cartridge or canister), any of the warning properties (e.g., odor, taste, eye irritation, or respiratory irritation) occur, promptly leave the area and check the following:

- Proper face seal
- Damaged or missing respirator parts
- Saturated or inappropriate cartridge or canister

If no discrepancies are observed, replace the cartridge or canister. If any of the warning properties appear again, the concentration of the contaminants may have exceeded the cartridge or canister design specification. When this occurs an airline respirator or SCBA may be required.

C. Service Life Of Air-Purifying Respirator Canisters And Cartridges

The canisters or cartridges of air-purifying respirators are intended to be used until filter resistance precludes further use, or the chemical sorbent is expended as signified by a specific warning property, e.g., odor, taste, etc. New canisters, cartridges or filters shall always be provided when a respirator is reissued. When in doubt about the previous use of the respirator, obtain a replacement canister or cartridge.

D. Supplied Air Respirator

When using an airlines respirator, leave the area immediately when the compressor failure alarm is activated or if an air pressure drop is sensed. When using an SCBA leave the are as soon as the air pressure alarm is activated.

TRAINING AND INFORMATION

Annual comprehensive training for employees who are required to use respirators is essential. Training will be coordinated through OHS prior to requiring the employee to use a respirator in the workplace. It is the responsibility of the Supervisor/Manager to ensure that their employees are trained before they begin work. The training shall ensure that each employee can demonstrate knowledge of at least the following:

- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator
- Limitations and capabilities of the respirator
- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions
- How to inspect, put on and remove, use, and check the seals of the respirator
- What the procedures are for maintenance and storage of the respirator
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
- Donning procedures and fit tests including hand's-on practice

Respirator training will be properly documented and will include the type and model of respirator for which the individual has been trained and fit-tested.

Retraining Shall Be Conducted Annually And When:

- Changes in the workplace or the type of respirator render previous training obsolete
- Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill
- Other situations arise in which retraining appears necessary to ensure safe respirator use

Training Is Divided Into The Following Sections:

Classroom Instruction

1. Overview of the Facility Respiratory Protection Program & CSA Z94.4-93 Standard
2. Respiratory Protection Safety Procedures
3. Respirator Selection
4. Respirator Operation and Use
5. Why the respirator is necessary
6. How improper fit, usage, or maintenance can compromise the protective effect.
7. Limitations and capabilities of the respirator.
8. How to use the respirator effectively in emergency situations, including respirator malfunctions
9. How to inspect, put on and remove, use, and check the seals of the respirator.
10. What the procedures are for maintenance and storage of the respirator.
11. How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
12. Change out schedule and procedure for air purifying respirators.

Fit Testing

- Mandatory for each type and model of respirator used under CSA Z94.4-93

Hands-On Respirator Training

1. Respirator Inspection
2. Respirator cleaning and sanitizing
3. Record Keeping
4. Respirator Storage
5. Respirator Fit Check
6. Emergencies

Medical Evaluations

A medical evaluation to determine whether an employee is able to use a given respirator is an important element of an effective Respiratory Protection Program and is necessary to prevent injuries, illnesses, and even, in rare cases, death from the physiological burden imposed by respirator use.

Supplemental Information For The Physician

The following information must be provided to the Physician before the Physician makes a recommendation concerning an employee's ability to use a respirator

- The type and weight of the respirator to be used by the employee
- The duration and frequency of respirator use (including use for rescue and escape)
- The expected physical work effort
- Additional protective clothing and equipment to be worn
- Temperature and humidity extremes that may be encountered
- Any supplemental information provided previously to the Physician regarding an employee need not be provided for a subsequent medical evaluation if the information and the Physician remain the same

Medical Determination

In determining the employee's ability to use a respirator, the College shall

- Obtain a written recommendation regarding the employee's ability to use the respirator from the Physician. The recommendation shall provide only the following information.
 - Any limitations on respirator use related to the medical condition of the employee, or relating to the workplace conditions in which the respirator will be used, including whether or not the employee is medically able to use the respirator.
 - The need, if any, for follow-up medical evaluations A statement that the Physician has provided the employee with a copy of the Physician's written recommendation.

Additional Medical Evaluations

At a minimum, Algonquin College shall provide additional medical evaluations that comply with the requirements of this section if:

- An employee reports medical signs or symptoms that are related to ability to use a respirator.
- A Physician, supervisor, or the respirator program administrator informs the College that an employee needs to be evaluated.
- Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation.
- A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

RESPIRATOR FIT-TESTING

Qualitative Fit Testing

A subjective evaluation of the quality of respirator fit. In a qualitative fit-test, a test atmosphere capable of stimulating the senses is generated around the wearer of the respirator equipped with the filter elements efficient in removing the test agent. If subtle leakage occurs, the wearer's senses will detect the stimulant. Three common fit-test agents are isoamyl acetate vapor (referred to as "banana oil"), saccharin, or Bitrex (Denatonium Benzoate), which will stimulate an involuntary smell, taste, and cough, respectively. If the fit-test qualitatively confirms that the respirator fits, then the specific protection factor assigned to the specific type of respirator can be assured.

A. Fit Testing Procedures -- General Requirements

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.
2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.
3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.
4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.
5. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.
6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:
 - (a) Position of the mask on the nose
 - (b) Room for eye protection
 - (c) Room to talk
 - (d) Position of mask on face and cheeks

7. The following criteria shall be used to help determine the adequacy of the respirator fit:
 - (a) Chin properly placed;
 - (b) Adequate strap tension, not overly tightened;
 - (c) Fit across nose bridge;
 - (d) Respirator of proper size to span distance from nose to chin;
 - (e) Tendency of respirator to slip;
 - (f) Self-observation in mirror to evaluate fit and respirator position.

8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described later in this section or those recommended by the respirator manufacturer which provide equivalent protection to the following procedures. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.

9. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface. Examples include stubble, beard, mustache or sideburns which cross the respirator sealing surface. Any type of apparel, which interferes with a satisfactory fit, shall be altered or removed.

10. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties.

11. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.

12. Exercise regimen. Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

13. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use, which could interfere with respirator fit.

14. Test Exercises.
 - (a) The following test exercises are to be performed for all fit testing methods prescribed in this appendix, except for the CNP method. A separate fit testing exercise regimen is contained in the CNP protocol. The test subject shall perform exercises, in the test environment, in the following manner:
 - (1) Normal breathing. in a normal standing position, without talking, the subject shall breathe normally.
 - (2) Deep breathing. in a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.

- (3) Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.
- (4) Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).
- (5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage shown below, count backward from 100, or recite a memorized poem or song.

Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

- (6) Grimace. The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT)
 - (7) Bending over. The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those tests environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.
 - (8) Normal breathing. Same as exercise (1).
- (b) Each test exercise shall be performed for one minute except for the grimace exercise, which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

Bitrex™ (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol

The Bitrex™ (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. Bitrex is routinely used as a taste aversion agent in household liquids which children should not be drinking and is endorsed by the American Medical Association, the National Safety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Taste Threshold Screening.

The Bitrex taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of Bitrex.

- (1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches (30.5 cm) in diameter by 14 inches (35.6 cm) tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.
- (2) The test enclosure shall have a $\frac{3}{4}$ inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.
- (3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a bitter taste
- (4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the Threshold Check Solution into the enclosure. This Nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.
- (5) The Threshold Check Solution is prepared by adding 13.5 milligrams of Bitrex to 100 ml of 5% salt (NaCl) solution in distilled water.
- (6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely, and is then released and allowed to fully expand.
- (7) An initial ten squeezes are repeated rapidly and then the test subject is asked whether the Bitrex can be tasted. If the test subject reports tasting the bitter taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.
- (8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.
- (9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.
- (10) The test conductor will take note of the number of squeezes required to solicit a taste response.
- (11) If the Bitrex is not tasted after 30 squeezes (step 10), the test subject is unable to taste Bitrex and may not perform the Bitrex fit test.
- (12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.
- (13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.
- (14) The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every four hours.

(b) Bitrex Solution Aerosol Fit Test Procedure.

- (1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.
- (2) The fit test uses the same enclosure as that described in (a.) 4. above.
- (3) The test subject shall don the enclosure while wearing the respirator selected according to section A.. The respirator shall be properly adjusted and equipped with any type particulate filter(s).
- (4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.
- (5) The fit test solution is prepared by adding 337.5 mg of Bitrex to 200 ml of a 5% salt (NaCl) solution in warm water.
- (6) As before, the test subject shall breathe through his or her slightly open mouth with tongue extended, and be instructed to report if he/she tastes the bitter taste of Bitrex.
- (7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test.
- (8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section A. 14.
- (9) Every 30 seconds the aerosol concentration shall be replenished using one half the number of squeezes used initially (e.g., 5, 10 or 15).
- (10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of Bitrex is detected. If the test subject does not report tasting the Bitrex, the test is passed.
- (11) If the taste of Bitrex is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

Positive – Negative Fit Test of Respirator Face-Piece

1. Negative Pressure Test

- Don air-purifying respirator with acceptable cartridges or canister secured in place.
- Adjust the face-piece and straps so that the respirator fits comfortably and snugly.
- Close off the inlet of the canister, cartridge, or filter by covering with the palms or squeezing the breathing tube (if applicable).
- Inhale so face-piece collapses and hold breath for 10 sec.
- Fit is acceptable if the face-piece remains collapsed without signs of influx of air?

2. Positive Pressure Test

- With the respirator still on, close off exhalation valve on the respirator by covering with palm.
- Exhale into the face-piece.
- Fit is acceptable if pressure builds without leakage based on efflux of air.

Quantitative Fit Testing

Quantitative fit testing, using using a device such as the Portacount Plus fit test system, is generally performed on both full-face and half-face negative pressure respirators. Fit factors are determined by comparing the particle concentration outside the respirator with the concentration inside the respirator face piece. An acceptable fit is achieved when the respirator wearer successfully completes a series of six programmed exercises (normal breathing, deep breathing, moving head up and down, moving head side to side, reading, and normal breathing) with a fit factor of 100 or more.

Face Piece Seal Protection

Algonquin College does not permit respirators with tight-fitting face pieces to be worn by employees who have:

- Facial hair that comes between the sealing surface of the face piece and the face or that interferes with valve function; or
- Any condition that interferes with the face-to-face piece seal or valve function.

If an employee wears corrective glasses or goggles or other personal protective equipment, the college shall ensure that such equipment is worn in a manner that does not interfere with the seal of the face piece to the face of the user.

Continuing Effectiveness of Respirators

It is imperative for safety purposes that employees conduct the following when leaving the respirator use area:

- To wash their faces and respirator face pieces as necessary to prevent eye or skin irritation associated with respirator use
- If they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the face piece
- To replace the respirator or the filter, cartridge, or canister elements.

If the employee detects vapor or gas breakthrough, changes in breathing resistance, or leakage of the face piece, the supervisor / manger must be notified immediately and the mask must be disposed of or repaired immediately.

Respirator User Cards

Respirator User Cards will be issued by OHS to workers who have been trained, fitted, and medically evaluated to use respirators. A Respirator User Card will include:

- Name and identification number of the worker.
- Date the test was conducted.
- The statement: " (name) has been trained, fitted and medically evaluated to use the respirator(s) indicated."
- The type(s), model(s), and size(s) of respirator(s) that the cardholder was issued.
- Expiration date of card.
- Type of fit test performed

ALGONQUIN COLLEGE	Respirator Fit Test Card
Student / Staff ID _____	
Name _____ has been trained, fitted and medically evaluated as required to use the respirator(s) indicated below.	
Make _____	
Models _____	
Size _____	
Qualitative / Quantitative	Expiry _____

Record Keeping

Respirator fit-testing shall be documented and shall include the type of respirator, brand name and model, method of test and test results, test date and the name of the instructor/tester (See Appendix A).

MAINTENANCE AND INSPECTIONS OF RESPIRATORS

Maintenance

The maintenance of respiratory protective devices involves a thorough visual inspection for cleanliness and defects (i.e., cracking rubber, deterioration of straps, defective exhalation and inhalation valves, broken or cracked lenses, etc.). Worn or deteriorated parts will be replaced prior to reissue. No respirator with a known defect is reissued for use. No attempt is made to replace components, make adjustments or make repairs on any respirator beyond those recommended by the manufacturer. Under no circumstances will parts be substituted, as such substitutions will invalidate the approval of the respirator. Either the manufacturer or a qualified trained technician will conduct any repair to reducing or admission valves, regulators, or alarms.

Respirators Shall Be Inspected As Follows:

- All respirators used in routine situations shall be inspected before each use and during cleaning
- All respirators maintained for use in emergency situations shall be inspected at least monthly and in accordance with the manufacturer's recommendations, and shall be checked for proper function before and after each use
- Emergency escape-only respirators shall be inspected before being carried into the workplace for use

Respirator Inspections Include The Following:

- A check of respirator function, tightness of connections, and the condition of the various parts including, but not limited to, the face piece, head straps, valves, connecting tube, and cartridges, canisters or filters
- Check of elastomeric parts for pliability and signs of deterioration.
- Self-contained breathing apparatus shall be inspected monthly. Air and oxygen cylinders shall be maintained in a fully charged state and shall be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level. The manufacturer shall determine that the regulator and warning devices function properly.

For Emergency Use Respirators The Following Additional Requirements Apply:

- Certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator.

- Provide this information on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in inspection reports stored as paper or electronic files. This information shall be maintained until replaced following a subsequent certification.

Cleaning of Respirators

All respirators in routine use shall be cleaned and sanitized on a periodic basis. Respirators used non-routinely shall be cleaned and sanitized after each use and filters and cartridges replaced. Routinely used respirators are maintained individually by the respirator wearer. Replacement cartridges and filters shall be made available in the user department.

The Respirators Shall Be Cleaned And Disinfected:

- After use to ensure that skin-penetrating and dermatitis-causing contaminants are removed from the respirator surface.
- Respirators issued to more than one employee shall be cleaned and disinfected before being worn by different individuals
- Respirators maintained for emergency use shall be cleaned and disinfected after each use
- Respirators used in fit testing and training shall be cleaned and disinfected after each use.

****Cleaning and Storage of respirators assigned to specific employees is the responsibility of that Employee.***

Procedure Recommended For Cleaning And Disinfecting Respirators:

1. Remove and discard all used filters, cartridges, or canisters.
2. Wash face piece and breathing tube in a cleaner-disinfectant solution. A hand brush may be used to remove dirt. Solvents, which can affect rubber and other parts, shall not be used.
3. Rinse completely in clean, warm water.
4. Air dry in a clean area in such a way as to prevent distortion.
5. Clean other respirator parts as recommended by the manufacturer.
6. Inspect valves, head straps, and other parts to ensure proper working condition.
7. Reassemble respirator and replace any defective parts.
8. Place in a clean, dry plastic bag or other suitable container for storage after each cleaning and disinfection.

Issuance of Respirators

Respiratory protective equipment shall not be ordered, purchased, or issued to personnel unless the respirator wearer has received respirator training and a fit test. New employees, who require respiratory protective equipment, must be placed on respirator training before being issued equipment.

OHS will co-ordinate all training, however it is the responsibility of the affected department to make available the equipment recommended by OHS. At the time of issue the appropriate canister is determined, based on the user's needs, and is issued with the appropriate facepiece. In addition, disposable respirators with filter ratings N-95 and N-100 are available for use under appropriate conditions.

Storage of Respirators

After inspection, cleaning, and any necessary minor repairs, store respirators to protect against sunlight, heat, extreme cold, excessive moisture, damaging chemicals or other contaminants. Respirators placed at stations and work areas for emergency use shall be stored in compartments built for that purpose, shall be quickly accessible at all times and will be clearly marked. Routinely used respirators, such as half-mask or full-face air-purifying respirators, shall be placed in sealable plastic bags. Respirators may be stored in such places as lockers or toolboxes only if they are first placed in carrying cases or cartons. Respirators shall be packed or stored so that the facepiece and exhalation valves will rest in a normal position and not be crushed. Emergency use respirators shall be stored in a sturdy compartment that is quickly accessible and clearly marked.

Repair of Respirators

Respirators that fail an inspection or are otherwise found to be defective will be removed from service to be discarded repaired or adjusted in accordance with the following procedures:

- Repairs or adjustments to respirators are to be made only by persons appropriately trained to perform such operations and shall use only the respirator manufacturer's NIOSH-approved parts designed for the respirator;
- Repairs shall be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed; and

Reducing and admission valves, regulators, and alarms shall be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

BASIC RESPIRATORY PROTECTION SAFETY PROCEDURES

Only authorized and trained Employees may use Respirators. Those Employees may use only the Respirator that they have been trained on and properly fitted to use.

1. Only Physically Qualified Employees may be trained and authorized to use Respirators. A pre-authorization and annual certification by a qualified physician will be required and maintained. Any changes in an Employees health or physical characteristics will be reported to OHS and will be evaluated by a qualified physician.
2. Only the proper prescribed respirator or SCBA may be used for the job or work environment. Air cleansing respirators may be worn in work environments when oxygen levels are between 19.5 percent and 23.5 percent and when the appropriate air-cleansing canister, as determined by the Manufacturer and approved by NIOSH or MESA, for the known hazardous substance is used. SCBAs will be worn in oxygen deficient and oxygen rich environments (below 19.5 percent or above 23.5 percent oxygen).

3. Employees working in environments where a sudden release of a hazardous substance is likely will wear an appropriate respirator for that hazardous substance (example: Employees working in an ammonia compressor room will have an ammonia APR respirator on.).
4. Only SCBAs will be used in oxygen deficient environments, environments with an unknown hazardous substance or unknown quantity of a known hazardous substance or any environment that is determined "Immediately Dangerous to Life or Health" (IDLH).
5. The last Employee using a respirator and/or SCBA that are available for general use will be responsible for proper storage and sanitation. Monthly and after each use, all respirators will be inspected with documentation to assure its availability for use.
6. All respirators will be located in a clean, convenient and sanitary location.
7. Management will establish and maintain surveillance of jobs and work place conditions and degree of Employee exposure or stress to maintain the proper procedures and to provide the necessary respiratory protective equipment.
8. Management will establish and maintain safe operation procedures for the safe use of RPE with strict enforcement and disciplinary action for failure to follow all general and specific safety rules. Standard Operation Procedures for General RPE use will be maintained as an attachment to the Respiratory Protection Program and Standard Operation Procedures for RPE use under emergency response situations will be maintained as an attachment to the Emergency Response Program.

For Continued Protection Of Respirator Users, The Following General Use Rules Apply:

- Users shall not remove respirators while in a hazardous environment
- Respirators are to be stored in sealed containers out of harmful atmospheres
- Store respirators away from heat and moisture
- Store respirators such that the sealing area does not become distorted or warped
- Store respirator such that the face piece is protected

PROCEDURES FOR IDLH ATMOSPHERES

For All IDLH Atmospheres, Managers / Supervisors Must Ensure That:

- One employee or, when needed, more than one employee is located outside the IDLH atmosphere
- Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere
- The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue
- The manager / supervisor or designee is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue

Employee(S) Located Outside The IDLH Atmospheres Will Be Equipped With:

- Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either
- Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry; or
- Equivalent means for rescue where retrieval equipment is not required.

Date: _____

Part I: Student/Employee Information

Name: _____ Student/Employee No: _____

Campus: _____ Program/Department: _____

Coordinator/Supervisor: _____ Telephone No/Ext.: _____

Part II: Respirator User's Health Conditions

The care of patients may require use of a respirator. Prior to being fit for a respirator, it is important that you be screened to determine that you are able to use one safely. This questionnaire is used to determine whether you have a medical condition that may affect your ability to use a respirator.

Please complete the following:

a. Do you have or have you had experienced any of the following conditions? (Please circle all that apply)

Shortness of Breath	Chest Pain on Exertion	Chronic Cough/ Bronchitis	Emphysema	Lung Disease
Breathing Difficulties/ Wheezing	Heart Problems	Allergies	Hypertension	Cardiovascular Disease
Temperature Susceptibility	Diabetes	Neuromuscular Disease	Fainting Spells	Dizziness/Nausea
Seizures	Thyroid Problems	Claustrophobia/Fear of Heights	Hearing Impairment	Dentures
Panic Attacks	Colour Blindness	Asthma	Pacemaker	Vision Impairment
Reduced Sense of Smell	Reduced Sense of Taste	Stroke	Back/Neck Problems	Facial Features/Skin Conditions
Injury/Surgery Affecting shape of the Jaw or Cheeks	Smoker			

Prescription Medication to Control a Condition: _____

Do you have any other medical conditions that you feel might affect your ability to use a respirator? If yes, please explain.

b. Have you had previous difficulty while using a respirator? _____ Yes _____ No

c. Do you have any concerns about your future ability to use a respirator safely _____ Yes _____ No

d. Have you had your blood pressure checked recently (within last 2 years)? _____ Yes _____ No

**Further assessment by a health care professional prior to respirator use is required
if you have indicated any of the conditions listed above in (a) (b) (c) or (d).**

Part III: Types of Respirators Used (check all that apply)

- | | | | | |
|---|---|---|---|--|
| <input type="checkbox"/> Tight-Fitting | <input type="checkbox"/> Non-Tight-Fitting (eg PAPR Hood) | <input type="checkbox"/> N95 | <input type="checkbox"/> Supplied-Air, Demand | <input type="checkbox"/> Supplied-Air, Continuous-Flow |
| <input type="checkbox"/> Supplied-Air, Pressure-Demand | <input type="checkbox"/> Supplied-Air Suit | <input type="checkbox"/> SCBA – Closed Circuit | <input type="checkbox"/> SCBA - Escape | <input type="checkbox"/> SCBA – Closed Circuit Escape |
| <input type="checkbox"/> SCBA – Open Circuit | <input type="checkbox"/> Air-Purifying, Powered | <input type="checkbox"/> Air-Purifying, Non Powered | <input type="checkbox"/> SCBA – Open Circuit | |
| <input type="checkbox"/> Combination Pressure Demand/Supplied-Air with Escape | <input type="checkbox"/> Combination Supplied-Air with Air-Purifying Elements | | | |

Part IV: Conditions of Use

Activities Requiring Respirator Use: _____, _____, _____

Frequency of Respirator Use: Daily Weekly Monthly Yearly
 UncertainExertion Level During Use: Light Moderate Heavy otherDuration of Respirator Use Per Shift <1/4 Hr >1/4 Hr >2 Hr Variable
 UnknownTemperature During Use: <0°C >0 and <25°C >25°CAtmospheric pressure During Use: Reduced Normal/Ambient Increased**Special Work Considerations**

-
- IDLH (Immediately Dangerous to Life or Health)
-
- Hazardous Materials (Emergency)
-
-
- Oxygen Deficiency
-
- Confined Space
-
-
- Other: _____

Other Personal Protective Equipment:

-
- Additional Types of Personal Protective Equipment Required: _____
-
-
- Estimated Total Weight of Tools/Equipment Carried During Respirator Use:
-
- Maximum
-
- Average

Signature of Respirator User: _____ **Date:** _____**Part VI: Health Care Professional Primary Assessment (if required)**

Assessment Date: _____

Respirator Use Permitted? Yes No UncertainReferred to Medical Assessment Yes No

Reassessment Date: _____

Part VII: Medical Assessment (if required)

Assessment Date: _____

-
- Class 1. NO restrictions
-
-
- Class 2. Some specific restrictions apply: _____
-
-
- Class 3. Respirator use is NOT permitted.

Name of Physician: _____ Signature of Physician: _____