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SELECTION, USE, AND CARE OF RESPIRATORY PROTECTION

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Office of Risk Management
Bureau de la gestion du risque

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1. PURPOSE:

The purpose of this procedure is to protect the health of workers who wear respirators. This document details the procedures used to select respirators, fit test employees with their respiratory protection equipment, as well as procedures for use and care of respirators. The decision to provide respirator protective devices (RPD's) should not be made lightly, but only after a documented complaint, demonstrated over-exposure, or requirement with the material in question. Accordingly, other avenues such as elimination / substitution of the material, engineering control etc. should be pursued first prior to requiring a respiratory protective device. For detailed information consult the *Ontario Health and Safety Act* and its Regulations as well as the *CSA Standard Z94.4-02 Selection, Use, and Care of Respirators*.

2. SCOPE:

The current procedure applies to all workers who are required to wear respirators during their employment tenure. This procedure is not adequate for fit testing mouth piece respirators or quarter-masks respirators. Therefore, it **DOES NOT** apply to employees who are required to use mouthpiece respirators or quarter-mask respirators.

3. RESPONSIBILITY & ACCOUNTABILITY:

The worker's supervisor is ultimately responsible to ensure proper selection of a respirator and to arrange the fit-testing for each type of respirator; either air purifying or air supplying (half mask, full mask, PAPR, etc.), for each employee based on exposure potential and personal needs. The employee shall wear the respirator when required, as well as care for the one assigned to them.

The Office of Risk Management can assist in the selection of a proper respirator. The Health, Wellness and Leave sector will provide the fit test training.

4. DEFINITIONS:

Buddy breathing – the use of an accessory device on a self-contained breathing apparatus or a practice that enables a second person to simultaneously share the same breathing gas supply as that of the user of such apparatus while both persons are attempting to move to a safe location.

Worker – means a person who performs work or supplies services for monetary compensation but does not include an inmate of a correctional institution or like institution or facility who participates inside the institution or facility in a work project or rehabilitation program (*OHS Act, Section 1(1)*)

Supervisor – means a person who has charge of a workplace or authority over a worker (*OHS Act, Section 1(1)*)

Competent person (OHS Act, Section 1(1)) – means a person who,

- a. is qualified because of knowledge, training and experience to organize the work and its performance,
- b. is familiar with the OH&S Act and the regulations that apply to the work, and
- c. has knowledge of any potential or actual danger to health or safety in the workplace.

Fit factor – a quantitative measurement of the fit of a particular respirator to a particular individual;

Fit test – the use of a qualitative or quantitative method to evaluate the fit of a specific make, model, and size of respirator on an individual;

Qualitative fit test (QLFT) – a pass/fail test method that relies on the subject's sensory response to detect a challenge agent in order to assess the adequacy of respirator fit (*CSA Z94.4-02*)

Quantitative fit test (QNFT) – a test method that uses an instrument to assess the amount of leakage into the respirator in order to assess the adequacy of respirator fit (CSA Z94.4-02)

Respirator

- a. Air purifying – a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element
- b. Air supplying – used whenever there is not enough oxygen or where hazards are immediately dangerous to health.
- c. Tight-fitting face-piece – a respirator inlet covering that forms a complete seal with the face. This includes a quarter-face-piece that covers the user's nose and mouth under the chin; and a full-face-piece that covers the user's nose, eyes, and mouth under the chin.

5. STANDARD:

All respirators shall be in accordance with the CSA Standard Z94.4-02; *Selection, Use, and Care of Respirators*, and National Institute for Occupational Safety and Health or its equivalent, which sets out requirements for the proper selection, fit testing procedures, use and care of respirators and related materials.

6. TYPES OF RESPIRATORS:

The two main types of breathing apparatus are air-purifying respirators (APRs) and supplied-air respirators (SARs). APR can be either mechanical (powered) or chemical (gas masks). Mechanical filters remove contaminants in the air by filtering out particulates (e.g. metal fumes, mists, etc.). Chemical cartridge filters purify air by adsorbing or neutralizing gases or vapours on a sorbent (adsorbing material) in a cartridge. They are tight-fitting and are available in several forms including half and full face respirators.

(Ref: CSA Standard Z94.4-02 Part 6.2)

7. RESPIRATOR SELECTION:

The supervisor must assess the hazard associated with each task and location. If the hazard cannot be eliminated through engineering or administrative controls, proper practices and procedures must be put in place and the personal protective equipment used as last line of defense.

Appendix 1 will provide information for the proper respirator selection when working with asbestos or asbestos-containing material. Any other type of hazard needs to be further assessed for its selection.

Each employee who requests a respirator or who is required by his or her supervisor to wear a respirator, must be medically examined before fit-testing and/or using a respirator. This is to ensure that the person is physically and psychologically able to perform work while using the respirator. The Health, Wellness and Leave Office from Human Resource Service will arrange for the assessment and fit testing to be done.

8. Health Surveillance

Prior to fit testing and initial respirator use, the supervisor shall ensure that documentation is completed that confirms that the worker (person using the respirator) is free from any physiological or psychological condition that may preclude him or her from being assigned the use of the selected respirator. All health information shall be treated as medically confidential – please visit the Health, Wellness and Leave Office, Human Resources (Tabaret 017): <http://www.hr.uottawa.ca/health/> for more information.

(Ref: CSA Standard Z94.4-02 Part 11.1)

Several types and sizes of respirators are available. However, the selection must be based on adequate protection, proper fit and comfort. Workers are shown how the respirator should be properly positioned on the face, how the strap tension should be set, as well as how to determine a proper fit of the respirator. A mirror should be available during the respirator selection to aid in evaluating the fit of the respirator. The most comfortable respirator should be donned and worn for 5 minutes to assess comfort. Assessment of the respirator includes the following points:

- Proper placement of the chin
- Positioning and fit of the mask on nose (for a half piece)
- Adjusting the strap tension
- Fit across nose bridge
- Room for safety glasses - without adversely affecting the seal of the respirator
- Ability to speak without adversely affecting the seal of the respirator
- Tendency of the respirator to slip
- Self-observation in mirror
- Adequate time for assessment and evaluation (5 minutes)

Note: The respirator will not provide the needed protection if the seal between the skin and the respirator mask is broken; this may happen if the worker has:

- A beard or facial hair (a worker donning a respirator shall be clean-shaven – no exceptions)
- Glasses
- Facial scars
- Long side burns
- Acne

(Ref: CSA Standard Z94.4-02 Part 7.1.8)

8.0 SEAL CHECK (CARTRIDGE RESPIRATOR):

Before fit testing and whenever the respirator is put on, a seal check shall be performed. Employees should perform a negative (inhalation check) and a positive (exhalation) pressure seal check; or a check recommended by the respirator manufacturer.

(Ref : CSA Standard Z94.4-02 Part 4.2(c))

To conduct a negative pressure seal check: cover the cartridges with your hands, inhale gently to collapse the face-piece slightly, and hold your breath for 10 seconds. If the face-piece remains slightly collapsed and no leakage is detected, the respirator fits properly.

To conduct a positive pressure seal check: cover the exhalation valve with your hand and exhale gently into the face-piece. If a slight positive pressure is built up inside the face-piece without any evidence of leakage, the fit is suitable.

Depending on the type of respiratory protection, qualitative and/or quantitative fit tests shall be conducted after the seal test.

9.0 FIT TESTING:

A qualitative or quantitative fit test has to be performed by a competent person to determine the ability of a worker to obtain an effective seal when using a tight-fitting face-piece. A seal check **cannot** be used as a substitute for a qualitative or quantitative fit test.

Fit testing shall be carried out:

- Prior to first wearing a respirator, but after the aforementioned medical assessment;
- When changes to the user's physical condition could affect the respirator fit;
- In case of any change in respirator face-piece (brand, model, size, age etc.); and
- at least every two years that the respirator is in use; however it is recommended that the respirator be re-tested annually

(Ref: CSA Standard Z94.4-02 Part 7.1.3)

The fit test shall be performed with all applicable protective equipment that may be worn during actual respirator use, which could interfere with the respirator fit (eg. safety glasses, hard hat etc).

Note: Whenever possible, testing should be performed under conditions that simulate actual work practice specific to the individual being fit tested.

9.1 QUALITATIVE TEST PROCEDURE:

A qualitative fit test can be performed with a variety of test agents including Isoamyl Acetate, Saccharin Solution Aerosol, Bitter Aerosol (Denatonium Benzoate), and Irritant Smoke (Stannic Chloride). The choice of the test agent will depend on the type of mask selected.

Note: Employees should not chew gum or tobacco, smoke, eat or drink anything other than plain water for 30 minutes prior to a qualitative fit testing to make sure that workers can detect the fit test agents by smell or taste (Ref: CSA Standard Z94.4-02 Appendix B – B2.2.2(a)).

A **qualitative** fit test shall be done in the following matter:

1. The worker puts on the selected respirator according to the manufacturer's instructions
2. He/she is asked to perform a seal check
3. When using a half-face respirators and irritant smoke as a test agent, workers should be reminded to keep their eyes closed during the test, since smoke can irritate the eyes.
4. A threshold check is preformed
5. The worker is exposed to an atmosphere containing an odorant, irritant or taste agent
6. The worker is then asked to perform the following exercises for at least 30 seconds:
 - Breathe normally
 - Breathe deeply
 - Turn their head from side to side; inhale and exhale when the head is at either side
 - Nod head up and down; inhale when the head is in fully up position, and exhale when the head is in fully down position
 - Talk aloud and slowly
7. The worker then reports any noticed odor or taste changes. If the test agent is detected, the test is immediately terminated due to improper fit. A different respirator is then selected, adjusted and the entire test procedure is then repeated until a respirator is deemed to fit that individual.
8. If the worker does not detect the test solution during the entire test, then the respirator fits properly. The type, size and style of respirator, including the cartridges needed are then documented and kept on file.

(CSA Standard Z94.4-02 Part 7.3)

9.2 QUANTITATIVE TEST PROCEDURE:

A quantitative fit test is designed to detect **any** leak and is used for oxygen-deficient and toxic environments. The procedure is similar to the qualitative fit test; whereas an agent is presented and if detected by the user/instrumentation then the fit is not sufficient.

Note: Employees should not smoke within 30 minutes prior to the quantitative fit test, to avoid erroneously low fit factors (Ref: CSA Standard Z94.4-02 Appendix C – C4.1).

The **quantitative** fit test should be done in the following manner:

1. The worker puts on the selected respirator according to the manufacturer's instructions
2. He/she is asked to perform a seal check.
3. The test agent concentration is measured in the test chamber.
4. After the employee enters the test chamber, the test agent concentration inside the respirator is measured.
5. The test agent concentration is measured consecutively while a worker is performing the following exercises for at least 30 seconds:
 - Breathe normally
 - Breathe deeply
 - Turn head from side to side
 - Nod up and down
 - Talking normally
 - Bend over at the waist as if he/she is trying to touch his/her toes
 - Jog on the spot
6. A particle counting instrument then compares the dust concentration in the surrounding air with the dust concentration inside the respirator.
7. The fit factor is determined by taking the ratio of the average test chamber concentration to the concentration measured inside the respirator for each test exercise (with the exception of the grimace exercise).
8. A minimum fit factor pass level of at least "100" is necessary for a half-mask respirator and "1000" for a full mask respirator for air purifying or SCBA.
9. If the respirator passes the test, then it fits properly. The type, size and style of respirator, including the cartridges needed are then documented and kept on file.

(Ref: CSA Standard Z94.4-02 Part 7.2)

10.0 TRAINING:

An employee who is required by the University of Ottawa to wear a respirator or who has requested a respirator for his/her work, must be instructed and trained in its care, use and limitations before the initial wearing of the respirator or protective device.

(Ref: O. Reg.851, s.79).

11.0 USE OF RESPIRATORS:

Prior to assigning a worker any task that requires the use of a respirator, the worker shall complete the selection, fit-testing, and training required for the use of respirators.

Personnel using respirators shall **always** be clean-shaven to allow for a proper seal between the skin and the respirator. A worker shall check the seal of the respirator immediately after donning it and periodically during use by positive and negative pressure checks. If an effective seal to the skin cannot be achieved, due to interference with other personal protective devices, a change in physical condition of the worker, or for any other reason, the respirator **shall not** be worn and the worker **will not** enter the hazardous area.

An employee must always ensure that the following materials do not interfere with the seal of the tight-fitting respirator:

- Side arms of eyeglasses
- Hair – including facial hair
- Clothes

- Tissue
- Straps
- Jewelry
- Other

Approved respirators are required under the following conditions:

- When working with hazardous chemical(s) that may expose the employee to gas, vapour, dust, fumes, mists, etc.
- When a Material Safety Data Sheet recommends a respirator use for certain chemicals.
- When an employee is working within the immediate vicinity of the potential exposure area; even though he/she is not working with a hazardous substance.

11.1 POTENTIAL EXPOSURES:

The following operations may potentially expose an employee to gas, vapour, dust, fumes, mists, etc, and thus respiratory protection is required:

- Asbestos abatement and working with asbestos-containing material (See Appendix 1)
- Dust atmosphere
- Application of paints with hazardous chemical ingredients
- Pesticide/herbicide application
- Chemicals used or biological substances
- Other

Note: NFPA, ANSI, IAFF, and most SCBA manufacturers do not recommend "buddy breathing" since it compromises one or more SCBA and can result in the needless impairment or death of either the rescuer or the victim, or both

(Ref: CSA Standard Z94.4-02 Appendix I).

12.0 MAINTENANCE OF RESPIRATORS:

Respirators should be properly maintained to preserve their original effectiveness. A good program of care shall include:

- Cleaning and sanitizing
- Inspection, testing, and repair
- Storage
- Record keeping (shall be kept current)

12.1 CLEANING:

Respirators must be cleaned after every use according to the respirator manufacturer's instructions or according to the following alternative procedure:

- Remove filters, cartridges canisters or any other components recommended by the manufacturer (anything not to be washed)
- Wash the respirator in warm water with a mild cleanser that contains a disinfecting agent
- Rinse the respirator very thoroughly in warm running water
- Allow respirator to air dry; alternatively, hand-dry with a clean, lint-free cloth
- Reassemble the face-piece, replacing filters, cartridges, and canisters where necessary
- Test the respirator to ensure that all components work properly
- Properly store the respirator. Storing in sealed bag is recommended.

Note: If the respirator is not individually assigned, then cleaning and sanitizing must be performed before the next use of the device

(Ref: CSA Standard Z94.4-02 Part 10.2).

12.2 INSPECTION:

Workers shall inspect their respirators before and after each use in accordance with the manufacturer's instructions. Inspection of the respirator includes the following points:

- Condition of component parts
- Tightness of connections
- End-of-service-life indicator
- Shelf-life dates
- Proper functioning of regulators, alarms, and other warning systems / devices

Defective or nonfunctioning respirators must be identified and tagged as "**out of service**" or equivalent and removed from service until repaired or replaced.

(Ref: CSA Standard Z94.4-02 Part 10.3)

12.3 REPAIR AND TEST:

Only qualified persons shall repair and test respirators and cylinders, using original manufacturer's replacement parts and repair procedures.

(Ref: CSA Standard Z94.4-02 Part 10.4)

12.4 STORAGE:

Respirators must be stored in a manner to protect them against dust, ozone, sunlight, heat, extreme cold, excessive moisture, or any other potential hazard that may have a detrimental effect on the respirator. Respirators shall be stored (in a sealed bag) in accordance with the respirator manufacturer's instructions to prevent the deformation of rubber or other parts.

Emergency respirators must be quickly accessible at all times, and the storage compartment must be clearly marked.

It is important to store the cylinders that are not in current use at reduced pressure to reduce the corrosion rate. For the same reason, cylinders shall be stored in the vertical position (valve up, never inverted), with the main valve closed. It is preferable to store cylinders indoors, in a warm and dry environment.

(Ref: CSA Z94.4-02 Part 10.5)

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APPENDIX 1 - RESPIRATOR SELECTION WHEN WORKING WITH ASBESTOS

Work Category		Required respirator
Type 1 Operations – (See asbestos regulation and University asbestos program)		
Worker requests that the employer provide a respirator to be used by the worker, as described in paragraph 12 of section 14		Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter
Type 2 Operations		
Work described in paragraph 1 of subsection 12 (3)		One of the following: - Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter - Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, P-100 or R-100 particulate filter - Negative pressure (demand) supplied air respirator equipped with a full-facepiece - Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece)
Work described in paragraphs 2 to 7 and 9 to 11 of subsection 12 (3)		Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter
Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable material containing asbestos by means of power tools, if the tool is attached to a dust collecting device equipped with a HEPA filter as described in paragraph 8 of subsection 12 (3)	Material is not wetted	One of the following: - Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter - Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, P-100 or R-100 particulate filter - Negative pressure (demand) supplied air respirator equipped with a full-facepiece - Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece)
	Material is wetted to control spread of fibre	Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter
Type 3 Operations		
Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable material containing asbestos by means of power tools, if the tool is not attached to a dust collecting device equipped with a HEPA filter as described in paragraph 5 of subsection 12 (4)	Material is not wetted	Pressure demand supplied air respirator equipped with a half mask
	Material is wetted to control spread of fibre	One of the following: - Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter - Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, P-100 or R-100 particulate filter - Negative pressure (demand) supplied air respirator equipped with a full-facepiece - Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece)
Work with friable material containing asbestos, as described in paragraphs 1 to 4 and 6 of subsection 12 (4)	Material is not wetted	Pressure demand supplied air respirator equipped with a full facepiece
Work with friable material, as described in paragraphs 1 to 4 and 6 of subsection 12 (4), that contains a type of asbestos other than chrysotile	Material was applied or installed by spraying, and is	Pressure demand supplied air respirator equipped with a half mask
Work with friable material, as described in paragraphs 1 to 4 and 6 of subsection 12 (4), that contains only chrysotile asbestos	wetted to control spread of fibre	One of the following: - Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter - Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, P-100 or R-100 particulate filter - Negative pressure (demand) supplied air respirator equipped with a full-facepiece - Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece)
Work with friable material containing asbestos, as described in paragraphs 1 to 4 and 6 of subsection 12 (4)	Material was not applied or installed by spraying, and is wetted to control spread of fibre	One of the following: - Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter - Powered air purifying respirator equipped with a tight-fitting facepiece (half or full-facepiece) and a high efficiency filter or N-100, P-100 or R-100 particulate filter - Negative pressure (demand) supplied air respirator equipped with a full-facepiece - Continuous flow supplied air respirator equipped with a tight fitting facepiece (half or full-facepiece)