
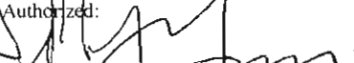
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Submitted: Risk Management Support Group	Approved:  Acting Vice President, Administration	Authorized:  President and Vice-Chancellor

## 1 PURPOSE

- 1.1 To protect staff and students from exposure to airborne contaminants, e.g. harmful dusts, fumes, gases, mists, smoke and or vapours, biological and radiological hazards.
- 1.2 To ensure compliance with the Occupational Health and Safety Act (OHSA), (R.S.O. and Regulations 1990, Sections 25 to 28, O. Reg. 851, R.R.O.1990, Industrial Establishments, 79, 127, 128 (2) (b), 130, 137, 138. O. Reg. 833 / 90 Control of Exposure to Biological or Chemical Agents, Sections 3,7, and Schedule (1) and CSA: Z94-4-02: Selection, Use, and Care of Respirators)

## 2 SCOPE


- 2.1 All faculty, staff, students, contractors and visitors.

## 3 RELATED DOCUMENTS


- 3.1 The Occupational Health and Safety Act of Ontario / Regulations for Industrial Establishment, R.S. O. 1990.
- 3.2 Canadian Standards Association (CSA).
  - Z. 94.4 – 02 Selection, Use and Care of Respirators
  - Z180.1- 00 Compressed Breathing Air and Systems.
- 3.3 NIOSH Standard 42 CFR 84 (1995) for Non – Powered Particulate Filtering Respirators
- 3.4 McMaster University Health and Safety Policy, RMM# 100
- 3.5 McMaster University Risk Management System, RMM# 101
- 3.6 McMaster University Safety Orientation and Training Program, RMM# 300
- 3.7 McMaster University Confined Space Entry Program, RMM #305
- 3.8 McMaster University Biohazards Safety Program, RMM #600
- 3.9 McMaster University Radiation Safety Program, RMM #700
- 3.10 McMaster University X-Ray Safety Program, RMM # 701

## 4 DEFINITIONS

- 4.1 **Aerosols:** Airborne solid or liquid particles.
- 4.2 **Air – line Respirator:** Supplies breathing air through a hose to the wearer's face piece.
- 4.3 **Air – Purifying Respirator:** Removes contaminants from workplace air by passing it through a filter, a cartridge or a combination of both, to provide protection from particulates, vapours or gases. Types of air-purifying respirators include the full - face piece (fits over the nose, mouth and eyes) and the half-face piece (fits over the nose and

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- mouth) that have attachments for filters and/or cartridges. Air-purifying respirators will not provide protection in oxygen deficient atmospheres.
- 4.4 **Assigned Protection Factor (APF):** A measure of the minimum anticipated workplace level of respiratory protection that would be provided by a properly functioning respiratory or class of respirators to a percentage of properly fitted and trained users.
- 4.5 **Chemical Cartridge:** Removes specific gases or vapours from the workplace atmosphere. High concentrations of contaminants, high humidity and high breathing rates will shorten the break through times and usefulness of chemical cartridges.
- 4.6 **Dusts:** Solid, mechanically produced particles or fibres; airborne solid particles caused by abrasive procedures such as grinding and cutting.
- 4.7 **Fit Testing:** Procedures to ensure a good seal between the respirator face piece and the face: may be qualitative (i.e. negative and positive pressure tests and tests relying on personal sensory response) or quantitative (i.e. utilize a particle generator and particle counter).
- 4.8 **Fumes:** Occur when metal is heated and suddenly cooled; regarded as airborne condensation of solid particles from hot processes involving metal, e.g. welding, brazing.
- 4.9 **Gases:** Substances that are in the gaseous state at ambient temperature and pressure.
- 4.10 **HEPA Filter:** High efficiency particulate air filter (99.7% efficient removal of 0.3 um particles).
- 4.11 **Mists:** Tiny liquid droplets caused by spraying or blowing operations;
- 4.12 **Particulate Filter:** Removes particulates (i.e. dusts, mists and fumes) from workplace air.
- 4.13 **Powered Air–Purifying Respirator:** Utilizes a blower which passes air through a filter or cartridge and then supplies air to the face piece; suitable for persons who have beards or lung disorders.
- 4.14 **Respirator:** Device designed to protect the wearer from inhaling hazardous atmospheric contaminants.
- 4.15 **Respiratory Protection:** systems of personal protective equipment designed to protect individual employees from exposure to unacceptable airborne exposures.
- 4.16 **Smoke:** Atmospheric contaminants resulting from incomplete combustion.
- 4.17 **Supervisor:** A person who has charge of a workplace or authority over a worker.
- 4.18 **Supplied Air Breathing Apparatus:** An-air line breathing apparatus that supplies breathing air to the wearer in accordance with CSA Standard Z180.1-M00.
- 4.19 **Vapours:** Substances that evaporate from a liquid or solid at ambient temperature and pressure.
- 4.20 **Worker:** a worker is a person who has entered into or is employed under a contract of service or apprenticeship, written or oral, expressed or implied, manual labour or otherwise.
- 4.21 **Acronyms:**
- ACGIH:* American Conference of Governmental Industrial Hygienists.
- APF:* Assigned Protection Factor.
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<i>CSA:</i>	<i>Canadian Standards Association.</i>
<i>IDLH:</i>	<i>Immediately dangerous to life or health.</i>
<i>CJHSC:</i>	<i>Central Joint Health and Safety Committee.</i>
<i>MOL:</i>	<i>Ministry of Labour.</i>
<i>NIOSH:</i>	<i>National Institute for Occupational Safety and Health.</i>
<i>EOHSS:</i>	<i>Environmental &amp; Occupational Health Support Services.</i>
<i>RMSG:</i>	<i>Risk Management Support Group</i>
<i>FHSc:</i>	<i>Faculty of Health Science Safety Office</i>
<i>SCBA:</i>	<i>Self Contained Breathing Apparatus.</i>
<i>QLFT:</i>	<i>Qualitative Respirator Fitting Tests.</i>
<i>QNFT:</i>	<i>Quantitative Respirator Fitting Tests</i>
<i>SOP:</i>	<i>Standard Operating Procedure</i>
<i>McIARS:</i>	<i>McMaster Institute of Applied Radiation Sciences</i>

## **5 RESPONSIBILITIES**

### **5.1 Role of Senior Managers (Deans / Directors / Chairs / Managers):**


Senior Managers shall:

- provide the required resources and direction to support and maintain an effective respiratory protection program;

### **5.2 Role of Supervisors (Administrative and Academic):**

The responsible supervisor shall:

- consider the feasibility of implementing engineering controls before implementing procedures which call for the use of respirators;
  - contact Environmental & Occupational Health Support Services (EOHSS) and FHSc Safety Office where applicable, before implementing respiratory protection procedures which call for the use of respirators;
  - register with EOHSS, and FHSC Safety Office where applicable, the names of all persons that may be required to use respirators and arrange for respirator fit testing to be conducted;
  - develop a Standard Operating Procedure (SOP) for all work involving the use of respirators and have all such SOP's approved by EOHSS and where applicable, FHSC Safety Office
  - contact the Respiratory Protection Program Administrator in all situations where a persons fitness or ability requires a medical opinion before wearing a respirator;
  - ensure that all persons required to wear SCBA undergo pre-use and annual cardiorespiratory performance evaluations;
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- ensure that all persons required to use respiratory protection receive initial and ongoing training as prescribed in Section 6 of the Respiratory Protection Program and as required by the conditions outlined in the SOP approved by EOHSS;
- ensure that all persons required to use respiratory protection, use and maintain the respirator in the prescribed manner;
- evaluate the effectiveness of the respiratory protection program on an ongoing basis and conduct an annual audit of the program in consultation with the JHSC.
- Specific areas such as Health Physics may have additional SOPs that satisfies their requirements.

### 5.3 **Role of Authorized Person:**


People authorized by their supervisor to wear respiratory protective equipment shall:

- work in compliance with the procedures outlined in the Respiratory Protection Program and the Standard Operating Procedure (SOP) related to the work being conducted;
- use, clean and store respiratory equipment in the prescribed manner;
- participate in safety training, annual respirator fit testing, medical assessment and medical surveillance as required by the program;
- notify the supervisor immediately when respiratory equipment needs servicing or replacement;
- provide input on the effectiveness of the program and participate in annual assessments of the program as scheduled by the CJHSC.

### 5.4 **Role of Risk Management Support Group**

Risk Management Group (RMSG) shall:

- implement and coordinate the Respiratory Protection Program;
  - provide advice and consultation for engineering controls to eliminate potential exposure to atmospheric contaminants;
  - provide advice on the selection and use of supplied air and air purifying respirators;
  - provide training in the care, use and storage of respirators
  - provide for respirator fit testing by competent and approved persons;
  - arrange for atmospheric monitoring to be conducted in suspect environments where exposure limits have been established; where applicable (i.e. confined space)
  - EOHSS and where applicable, FHSC Safety Office, to coordinate medical assessments if required for persons required to use respirators;
  - maintain records of respirator use which include:
    - i. the names and departments of persons required to wear respirators;
    - ii. information on the assigned NIOSH approved respirator;
    - iii. fit testing records for all persons registered in the program;
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iv. names of persons requiring annual medical reviews.

- conduct periodic audits to determine the effectiveness of the Respiratory Protection Program to ensure that the
  - (a) proper types of respirators are being selected;
  - (b) wearers are properly trained
  - (c) correct respirators are issued and used;
  - (d) respirators are worn properly;
  - (e) respirators are properly maintained;
  - (f) respirators are inspected; and
  - (g) respirators are properly stored
- provide copies of the registry of persons required to wear respirators to the JHSC's, if requested;
- designate a Respiratory Protection Program Administrator within EOHSS /FHSc Safety Office/Health Physics who is qualified by appropriate training and experience to implement and coordinate the program.

#### 5.5 **Respiratory Protection Program Administrator:**


- coordinate the Respiratory Protection Program within the various areas serviced by the Risk Management Group;
- obtain medical advice as required when a person's fitness or ability to wear a respirator require such advice and;
- maintain Respiratory Protection Program Records (Section 8)

#### 5.6 **Central Joint Health and Safety Committees (CJHSC):**

- shall review and comment on the Respiratory Protection Program on a scheduled basis.

## 6 **TRAINING**

- 6.1 The following persons shall be given adequate training by a qualified person(s) to ensure the proper use of respirators:
- (a) The respirator user
  - (b) The supervisor of persons using respirators
  - (c) The person issuing respirators
  - (d) The person performing fit tests; and,
  - (e) The person maintaining and repairing respirators.
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- 6.2 A minimum training program for every person required to wear respirators shall consist of
- (a) A discussion of the nature, extent, and effects of respiratory hazards to which the person may be exposed;
  - (b) An explanation of the operation, limitations, and capabilities of the selected respirator(s);
  - (c) Instructions in procedures for the inspection, donning and removal, checking the fit and seals, and in wearing the respirator. Sufficient practical experience shall be provided and enable the person to become thoroughly familiar and confident with the use of the respirator;
  - (d) An explanation of the procedure for maintenance and storage of the respirator;
  - (e) Instruction in how to deal with emergency situations involving the use of different respirators or the malfunction of respirators; and
  - (f) A SCBA training program shall include instruction and practice in controlled breathing and simulated use conditions at least once per year.
- 6.3 Every person required to use a respirator shall be trained at least annually. Where necessary, more frequent training shall be performed
- 6.4 A training record system that meets the requirements of the regulator authority shall be maintained (see Section 8).

## 7 GENERAL PROCEDURES

In drafting a Standard Operating Procedure (SOP) for the use of respirators the following procedural guidelines shall be followed:

- 7.1 **Engineering Controls:**  
 Whenever possible respiratory hazards in the workplace must first be evaluated and controlled by engineering methods before considering the use of air purifying respirators. NB. Atmospheric contaminant concentrations are usually measured in mg/m<sup>3</sup> for solids and parts per million (ppm) for gases. Potential exposure levels of such contaminants must be compared with MOL or ACGIH occupational exposure limits to determine the potential for respiratory risk.
- 7.2 **Standard Operating Procedures (SOP):**  
 An SOP identifying the task requiring the use of respirators, the contaminants involved, the names of the persons to be placed on the Respiratory Protection Program, the selected respiratory protection and training requirements shall be prepared by the supervisor and filed with EOHSS and where applicable, FHSc Safety Office
- 7.3 **Medical Evaluation:**  
 A medical opinion is required when a person's fitness or ability to wear a respirator is in question. When the program administrator considers that, due to a person's fitness or ability, a medical opinion is required before wearing a respirator, that person shall obtain a medical opinion from a physician who is knowledgeable about the work and the condition of the work of that person. The physician shall inform the Occupational Health Nurse as to the fitness or ability of that person to wear a respirator; however, details of
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any medical examination shall not be disclosed unless consent has been obtained from the person examined.

#### 7.4 **Respirator Selection:**

As identified in CSA Z 94.4-02, in selecting a respirator, consideration must be given to (a) Air sampling and analyses, (b) Characteristics of the hazardous operation or process; (c) Use-time period; (d) Nature of work; (e) Physical characteristics, functional capabilities, and limitations of respirators of various types; (f) Respirator fit; and (g) Interaction with other protective equipment.

Tables 1 and 2 in CSA Z 94.4-02 describe the minimum respiratory protection based on the degree of hazard and Assigned Protective Factors (APF), respectively.

The atmospheric hazards may be assessed by air sampling or by evaluation of the potential for exposure created by the task being considered. Extra care must be taken when selecting respirators for contaminants that exist as both particles and vapours. Information on the contaminant phase is contained in the ACGIH TLV listings. Low vapour pressure contaminants with a TLV listed only as mg/m<sup>3</sup> are assumed to exist in the particle phase and would require a particle filter. Contaminants with TLV are listed in both ppm and mg/m<sup>3</sup> are generally found in the vapour phase and would require a chemical cartridge. Mixtures of contaminants in the workplace air indicate that both filters with particle and vapour removing capabilities are required. **NB. As professional advice and assistance is essential for proper respirator selection, EOHSS must be consulted and all respirators must be NIOSH approved**

#### 7.5 **Respirator Fit Testing:**

Initial fit tests, using one of the following procedures must be provided for all persons required to wear a respirator:

- Qualitative Respirator Fitting Tests (QLFT) is a test using approved odour penetrating agents;
- Quantitative Respirator Fitting Tests (QNFT) involve exposing the respirator wearer to a test atmosphere containing an easily detectable nontoxic aerosol, vapour or gas as the test agent, and measuring the penetration of the test agent into the respirator;
- Negative and positive field tests can be conducted on respirators equipped with face pieces that contain both inhalation and exhalation valves.

**NB. All respirator fit tests must be arranged by RMSG and conducted by authorized persons. All users of respirators must be trained in the proper method for conducting field fit test for the respirator being used.**

- **Fit testing records shall be kept (Section 8)**

#### 7.6 **Assigned Protection Factor (APF):**

In selecting a respirator the APF must be greater than the expected air contaminant concentration divided by its exposure limit e.g. if the expected air concentration of the contaminant is 60 ppm and exposure limit is 2ppm a respirator with an APF >30 must be used.



The following table illustrates values of assigned protection factors for various types of respirators:

Respirator Type		APF
Air Purifying	Half-face piece	10
	Full-face piece	100
Power Air Purifying	Full-face piece	100 (dusts/mists for)
	Hood or Helmet	100 (for dusts/mists)
Air-Line	Full-face piece pressure demand	1,000
SCBA	Full-face piece pressure demand	10,000

### 7.7 Supplied Air Respirators and SCBA's:

Supplied air respirators and SCBA's are subject to different standards than those for particulate or gas filtering respirators (See Appendix A).

Supplied air respirators and SCBA's provide protection against oxygen deficiency and toxic atmospheres. Positive pressure demand units protect against the inward leakage of contaminants.

**NB.** A risk assessment will be conducted by EOHSS and FHSc Safety Office, where applicable before departmental use of a SCBA. **Extensive training is mandatory for persons who must rely on this type of respiratory protection. Training exercises with SCBA's must be conducted every three months.**

**Air line respirators provide no protection if the air supply fails. These respirators are therefor limited to use in areas from which the wearer can escape unharmed.**

**Supplied-air respirators used in high and low temperature environments are subject to the potential for serious functional changes that affect performance and safety.**


**Users must be aware of such limitations and seek professional assistance prior to using Supplied Air Respirators or SCBA's.**

## 8 RECORDS

To facilitate regulatory compliance and management of the Respiratory Protection Program, the following information shall be documented and retained:

### 8.1 **Documentation:** A Standard Operating Procedure (SOP) which provides the following information:

- The nature of the atmospheric hazard and work location; (e.g. dust, fumes, mists, vapours, gases or oxygen deficiency);

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- The name of the supervisor and department responsible for the safety of the persons required to wear respiratory protection;
- The names of all persons required to wear air purifying, supplied air or SCBA;
- The names of persons requiring annual medical reviews (e.g. cardiorespiratory performance evaluations);
- The selected NIOSH or CSA approved respiratory protection and date when fit testing was conducted;
- Confirmation of initial training and schedule for retraining (See Respiratory Protection Program Section 6.)

8.2 **Retention:** Copies of SOP's for respiratory protection shall be retained as follows:

- SOP's will be retained by the responsible supervisor for a period of three years beyond the completion date of the task or project;
- A list of SOP's involving the use of respiratory protection will be filed with and retained by Program Administrator for a period of three years beyond the completion date of the task or project.
- Copies of the current SCBA maintenance records shall be retained by RMSG.

### 8.3 **Fit Testing Records:**

Records of respiratory fitting tests shall be made and held in safe-keeping by the program administrator. The records shall include, but are not limited to the

- (a) Name of the person tested;
- (b) Date and time of tests;
- (c) Specific make, model, style and size of respirator
- (d) Type of fitting test and test agent used
- (e) Results of fitting tests
- (f) Comments on test difficulties, interference by clothing, protective equipment that needs to be worn in conjunction with the respirator, personal fitting problems, eg, eyeglasses, dentures, unusual facial features, or facial hair; and
- (g) Name of person giving the test

### 8.4 **Training Records:**

Records shall be kept on the type of training each person has received and the dates these training sessions occurred. The records shall be kept by the program administrator as well as supervisor for at least the duration of employment of the person trained.

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## Appendix A

### Codes and Standards

#### Canadian Respiratory Protection Standard, CSA Z94.4-02:

Canada's respiratory protection standard, CSA Z94.4-93 Selection Care and Use of Respirators is intended to promote the correct use of respiratory protection, not to specify performance criteria. In this regard, it defaults to NIOSH requirements. The NIOSH standards are important to respirator users because they help define selection criteria.

#### NIOSH Standard 42 CFR 84 (1995) for Non-Powered Particulate Filtering Respirators:

After July 1998, all non-powered particulate-filtering respirators used in Canada must comply with one of nine classes of NIOSH-approved respirators. There are three basic series of filters: N, R, and P, and each series comes in three filtration efficiencies: 95% 99% and 99.7% at 0.3 microns where particle capture processes are least efficient. The respirator series are defined as follows:

**N Series:** Non-oil, for dust, mist or fume that is not an oil;

**R Series:** oil-Resistant, can be used for up to eight hours in an atmosphere containing a particulate oil or oil based substance;

**P Series:** oil-Proof, can be used indefinitely in an atmosphere containing particulate oil, subject to considerations of hygiene, damage and breathing resistance.

#### NIOSH Respirator Standard 30 CFR 11 (1972):

This NIOSH respirator standard still applies to respirators worn to protect against gases (e.g. ammonia) and vapours (e.g. from evaporated fuel or solvent).

For further information about NIOSH Standards, see web site: [www.cdc.gov/niosh](http://www.cdc.gov/niosh)

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Appendix B

**McMaster University  
Respirator Program (RMM 311) Fit Testing Record**

1. Name (individual being fit tested): \_\_\_\_\_
2. Individual administering test: \_\_\_\_\_
3. Date: \_\_\_\_\_
4. Respirator individual is being fit tested for: (make, model, style & size):  

Brand & Type	Model	Size	Cartridge type	Hazard
_____	_____	_____	_____	_____
5. Type of fit test (circle):    Quantitative                      Qualitative
6. Results (circle):                      Pass                                      Fail
7. Tester's Signature: \_\_\_\_\_                      Date: \_\_\_\_\_

Re-certification Medical Questionnaire (This portion needs to be completed annually to evaluate whether medical conditions have changed since the previous respirator approval.) If any of the questions below are marked YES, the employee must contact Occupational Health for further medical review:

1. Do you have any known or suspected major health problems at the present (i.e. heart, lungs, high blood pressure) or are you under the care of a doctor for diagnosis or treatment?  
NO \_\_\_\_ YES \_\_\_\_ (if yes, please explain \_\_\_\_\_)
2. Have you had any major health or physical problems in the past that has left you with any lasting impairment of bodily function, limitation, or restriction in normal physical activity?  
NO \_\_\_\_ YES \_\_\_\_ (if yes, please explain \_\_\_\_\_)
3. Do you have any significant symptom or health problem that you believe would be made worse by using respiratory protective equipment?  
NO \_\_\_\_ YES \_\_\_\_ (if yes, please explain \_\_\_\_\_)
4. Other than the mild discomfort of and/or annoyance experienced while wearing respirators do you have any major objections to using respiratory protective equipment?  
NO \_\_\_\_ YES \_\_\_\_ (if yes, please explain \_\_\_\_\_)

Employee's Signature \_\_\_\_\_                      Date \_\_\_\_\_