

RESPIRATORY PROTECTION PROGRAM

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1.0 Purpose

This program aims to protect the health and safety of University of Waterloo workers, students, and visitors from atmospheric contaminants. Respiratory hazards include airborne contaminants such as dusts, mists, fumes, gases, or oxygen-deficient atmospheres. Well-designed and maintained engineering controls are the preferred methods of controlling worker exposure to hazardous contaminants in the air. These control methods include:

- The use of mechanical ventilation.
- Enclosure or isolation of the process or work equipment.
- Proper control and use of process equipment.
- Process modifications including substitution of less hazardous materials where possible.

2.0 Scope

This program applies to anyone who is required to use a respirator to protect themselves from any known or potential respiratory hazards to which O. Reg. 833 Control of Exposure to Biological or Chemical Agents or O. Reg. 490 Designated Substances applies. This program is not intended to address the selection of respirators for use against infectious agents and Chemical Biological Radiological Nuclear (CBRN) agents.

The University of Waterloo's Respiratory Protection Program is in place to ensure workers are protected from inhaling hazardous substances, such as, but not limited to:

- Particulates
- Fumes
- Mists
- Gases
- Vapours
- Bioaerosols

Use of respirators is to be approved by the Safety Office when:

- Engineering or administrative control measures are not practical, adequate or feasible.
- While the engineering or administrative controls are being instituted.
- During shutdown for maintenance, repair or emergency.

3.0 Definitions

ACGIH Table

Means the table entitled "Adopted Values" shown at pages 11 to 62 of the publication entitled *2017 Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices* published by ACGIH and identified by International Standard Book Number 978-1-607260-90-5

Bioaerosol

A liquid droplet (generated, for example, by coughing, sneezing, or a medical procedure such as bronchoscopy) or a solid particle (generated, for example, by sweeping or shovelling) suspended in the air and that is living or originates from living organisms. Bioaerosols include living or dead micro-organisms, fragments, toxins, and particulate waste products from all varieties of living things. They are capable of causing infection or adverse or allergic response.

Bioaerosols range in size from submicroscopic particles ($< 0.01 \mu\text{m}$) to particles greater than $100\mu\text{m}$ in diameter.

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.

End-of-service-life indicator (ESLI)

A system that warns the respirator user that the sorbent is approaching saturation or is no longer effective.

Fit factor

A quantitative measure of the fit of a particular respirator to a particular individual.

Fit test

The use of a qualitative or a quantitative method to evaluate the fit of a specific make, model, and size of respirator on an individual.

Force fitting

The practice of repeating a failed fit test with the same respirator by redonning or otherwise adjusting it (e.g., overtightening the straps) until a fit test pass is finally obtained. The user may adjust the respirator but comfort should be maintained.

Fumes

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 (e.g., oxidation). See the definition of particulate for more.

Gas

A substance that is in the gaseous state at ambient temperature and pressure.

Immediately dangerous to life or health (IDLH) atmosphere

An atmosphere that poses an immediate threat to life or that will cause irreversible adverse health effects or impair an individual's ability to escape.

Intrinsically safe respirator

A respirator that has been certified as not being a source of ignition.

Mist

Liquid particles when in a gaseous medium. See the definition of particulate for more.

Ontario Table

Means table 1 in O.Reg 833 Control of Exposure to Biological and Chemical Agents

Particulate

Any liquid or solid airborne contaminant, other than a gas or vapour, but including dusts, fumes, mists, fibres, fog, pollen, smoke, spores, and bioaerosols.

Program administrator

The individual designated to ensure the development, implementation, and maintenance of the respiratory protection program.

Qualified person

An individual who possesses the knowledge, experience, and training to fulfill the competencies of the role(s) defined in this program.

Qualitative fit test (QLFT)

Definition 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.

Respirator

A device that is tested and certified by procedures established by testing and certification agencies (NIOSH, CEN Notified Bodies, etc.) recognized by the authority having jurisdiction. It is used to protect the user from inhaling a hazardous atmosphere.

Sanitization

The use of an accepted product to clean and reduce the level of microorganisms on the surfaces of inanimate objects in order to mitigate or prevent the transmission of disease to humans.

Self-contained breathing apparatus (SCBA)

A respirator that has a portable supply of breathing gas and is independent of the ambient atmosphere. SCBAs include both open-circuit and closed-circuit respirators.

Service life

The period of time when a respirator provides adequate protection to the user.

STEL or "Short Term Exposure Limit"

Means the maximum airborne concentration of a biological or chemical agent to which a worker may be exposed,

- a) In any 15 minute period,
- b) No more than four times during an eight hour work shift, and
- c) With at least one hour between exposures

If a STEL is not listed in the Ontario table or ACGIH table then use three times the TWA for any period of 15 minutes

Supervisor

The employer or a person assigned by the employer who has authority for the respirator user and control over the workplace.

Worker

Anyone performing a task, whether or not compensation is received, at the University of Waterloo.

4.0 Roles and Responsibilities

4.1 Supervisor and Departments

- Contact the Safety Office for approval prior to using respirators.
- Ensure that health screening, fit testing, and training are completed prior to assigning a user any task that requires using a respirator.
- Ensure respirator users are following the procedures contained in this program.
- Ensure that respirators are used in accordance with training and written instructions.
- Provide details, as requested, of the anticipated working conditions to the Occupational Health Nurse at Health Services for the purpose of conducting a medical assessment of the respirator user.
- Notify the Safety Office of user concerns or any changes that may have an impact on the environmental conditions.
- Notify the Safety Office of investigation reports that reveal the use of a respirator may have prevented or contributed to an accident or injury.

4.2 Workers

- Ensure that respirators are:
 - Used in accordance with section 5.2 - Respirator Use.
 - Maintained in accordance with section 5.3 – Care and Maintenance.
 - Inspected in accordance with section 5.4 – Inspection.
 - Stored in accordance with manufacturer’s instructions and section 5.5 – Respirator Storage.
- Remove from service any respirator they deem to be defective and report it to their immediate supervisor or other responsible person.
- Complete the Health Screening Form in accordance with section 5.6 – Health Surveillance.

- Report to their supervisor or Occupational Health Nurse any condition or change that may have an impact on their ability to use a respirator safely.

4.3 Safety Office

- Act as the program administrator.
- Maintain records of hazard assessments, training, and fit tests.
- Perform hazard assessments as per section 6 of CSA Z94.4-11.
- Select a respirator based on the hazard assessment.
- Ensure fit testers are qualified.

4.4 Fit Tester

- Follow the procedures in this program.
- Ensure there is no interference with face to skin seal.
- Verify the user is competent in donning, performing user seal checks, and doffing.
- Conduct irritant smoke fit test to verify user's ability to obtain an acceptable fit and effective respirator seal.
- Complete a Record of Training for the user and forward to the Safety Office.
- Ensure proper cleaning and sanitizing of shared respirators used for fit testing between user's fit tests.

4.5 Occupational Health and Safety

- Review medical screening forms.
- Establish & maintain health surveillance when necessary.
- Provide assistance when making accommodations for medical reasons.
- Refer respirator users to a physician when deemed necessary.

5.0 Procedures

5.1 Fit Testing

- Fit testing at the University shall be done according to CSA Z94.4-11 Annex B - Irritant Smoke QLFT Protocol.
- To be conducted prior to initial use of tight-fitting respirator and conducted every two years.
- Prior to fit testing, the user shall complete a health surveillance evaluation; all results off the health surveillance evaluation will be kept confidential.
- The user shall wear all applicable PPE during the fit test (e.g., hearing, head, and eye protection) if it is required to perform their duties.

- Fit testing shall occur whenever there is a change in the respirator (e.g., brand, model, or size).
- Whenever changes to the user's physical condition could affect the fit of the respirator.
- No user shall use a tight-fitting respirator until a satisfactory fit test is achieved.
- The person undergoing fit testing shall not have unacceptable facial hair if the respirator is tight-fitting.
- The fit tester will not force fit a respirator after a failed fit test.
- The fit tester will ask the respirator user to evaluate the comfort of the respirator

5.2 Respirator Use

- Prior to any employee using a respirator, they shall complete all health screening, fit-testing, and training requirements required by the University.
- Respirators requiring a tight face-to-face piece seal shall not be used when the seal cannot be maintained due to hair, clothing, straps, jewelry, eyeglasses, or any other form of interference.
- Other PPE (hearing protection, head protection, etc.) shall not interfere with face-to-face piece seal.
- User seal checks shall be performed immediately after donning tight-fitting respirators and periodically during use.
- Respirators that have an electrical power supply shall be intrinsically safe.
- Buddy breathing is not permitted.
- Special precautions must be taken when working in high and low-temperature environments.
- Air-purifying respirators shall not be used in IDLH situations.

5.3 Care and Maintenance

- All respirators must be kept clean and free from dirt.
- Single use respirators must be disposed of after use.
- Respirators used by a single user must be cleaned and sanitized as needed.
- Respirators shared with other employees must be cleaned and sanitized after every use.
- Cleaning and sanitizing consists of:
 1. Complete disassembly of respirator according to manufacturer's instruction.
 2. Inspection of all parts for wear and damage.

3. Washing all parts (except for cartridge or filter elements) in warm water using a mild detergent, such as dish soap and a soft bristle brush (not wire) may be used to remove dirt.
4. Rinse all parts (except for cartridge or filter elements) in warm water.
5. Disinfect respirator by soaking all parts (except for cartridge or filter elements) in disinfectant solution (10ml of household bleach per 100ml of water) for 2 min and thoroughly rinse off all disinfected parts, or wipe all parts with a disinfecting towelette.
6. Dry all parts with a soft lint-free cloth or allow to air dry in a dust free environment.
7. Reassemble the respirator.

5.4 Inspection

- Users shall inspect the respirator before and after each use for the following:
 - Condition of component parts (e.g. face piece, valves, connecting tubes, filters, cartridges, harness assemblies, etc.).
 - The tightness of connections.
 - End-of-service-life indicator (ESLI) if present, or date stamps.
 - Proper functioning of regulators, alarms, and other warning systems.
- If the respirator fails inspection, it shall be tagged and removed from service until repaired by a qualified person or replaced.
- Emergency-use SCBA inspection requirements:
 - Emergency-use SCBA shall be inspected every 6 months.
 - Inspection tags must be kept with the SCBA.
 - Pressure gauges of all breathing gas cylinders shall read in the “full” range, cylinders with gauges that do not read in the “full” range need to be refilled.

5.5 Storage

- Store respirators such that they are protected from dust, ozone, sunlight, heat, extreme cold, moisture, vermin, chemicals, oils, greases, or any other potentially harmful situation.
- Store respirators in a manner that will not cause deformation of rubber or other elastomeric parts.
- Emergency and rescue-use respirators must be stored in clearly marked and readily accessible locations at all times.

5.6 Health Surveillance

- Respirator users must complete a screening form prior to using a respirator for the first time and after any new health issues arise.
- The screening form is submitted to the occupational health nurse for evaluation and they will determine if a doctor's opinion is necessary.
- All health information will be kept confidential and in the care of the occupational health nurse.
- Health professionals will indicate whether the user meets the medical requirements, meets the medical requirements with limitations, or does not meet the medical requirements.
- If the user meets the requirements with limitations, these limitations must be stated in the written opinion.

5.7 Hazard Assessment

- Identify what contaminants are present in the workplace and take all reasonable measure to protect workers from exposure which include;
 - Substitution of the hazardous agent
 - Engineering controls
 - Administrative controls, including work practices
 - Hygiene facilities and practices; and
 - Personal protective equipment (including respirators) when substitution or engineering controls are not reasonable or feasible
- Identify the physical states of all airborne contaminants.
- Measure or estimate the concentration of the contaminants using procedures that comply with recognized industrial hygiene methods and are performed by, or under the direction of, a qualified person.
- If direct reading instruments are used to determine airborne concentrations, that they are used, calibrated and maintained in accordance with the manufacturer's instructions.
- Determine if the atmosphere is potentially oxygen deficient.
- Identify an appropriate occupational exposure limit for each airborne contaminant.
- Determine if an IDLH atmosphere is present.
- Determine if there is an applicable health regulation or a substance-specific standard for the contaminants.
- Determine for particulate hazards if there is oil present.

- Determine if the contaminant can be absorbed through, or is irritating to, the skin or eyes.

6.0 Training

All employees that are required to wear a respirator, and supervisors that require their employees to wear a respirator, must undergo training to be considered a competent respirator user. Employee training consists of:

- Roles and responsibilities of the user and maintenance
- Medical assessment process
- Fit testing
- General knowledge
- Care and practical use
- Limitations
- Repair and maintenance

7.0 Record keeping

- The Safety Office shall keep documentation for:
 - Hazard assessments
 - Training
 - Fit tests
- Records of training shall include:
 - Name of person tested
 - Date of test
 - Specific make, model and size of respirator
 - Training elements
 - Fit test exercises
 - Name of fit tester
 - Notes on restriction
- Occupational Health shall keep medical screening forms and documentation from physicians.

8.0 Record of Revisions

Date	Author/Editor	Change	Version
March 2021	Doug Dye	<ul style="list-style-type: none"> No changes 	Respiratory Protection Program_v.1.3_MAR2021
March 2020	Doug Dye	<ul style="list-style-type: none"> Updated section 2.0 Scope to reflect that Regulations 833 and 490 apply to the program Added terms to section 3.0 Definitions Added the following to section 5.7 Hazard Assessment: <ul style="list-style-type: none"> Hierarchy of controls Procedures for monitoring, sampling and determining airborne concentrations and worker exposure to a biological or chemical agent 	Respiratory Protection Program_v.1.3_MAR2020
March 2019	Doug Dye	<ul style="list-style-type: none"> Added user comfort during fit testing as an additional factor in respirator selection 	Respiratory Protection Program_v.1.2_MAR2019
March 2018	Doug Dye	<ul style="list-style-type: none"> Added section 3.0 Definitions Added section 4.4 Fit Tester (Responsibilities) Added section 11.0 Appendix C – Acceptable and Unacceptable Facial Hair Updated section 10.0 Appendix B – Respirator User Screening Form to increase privacy Updated section 6.0 Training to improve to include training elements 	Respiratory Protection Program_v.1.1_FEB2018

9.0 Appendix A - Fit Test Record

University of Waterloo Safety Office



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This certifies that _____ has been fit tested for and trained in the care and use of a _____ Size _____.

CSA Z94.4-11 Annex B QLFT (Irritant Smoke Protocol) was used.

- | | |
|--|---|
| <input checked="" type="checkbox"/> User responsibilities | <input checked="" type="checkbox"/> Normal breathing |
| <input checked="" type="checkbox"/> Medical Screening | <input checked="" type="checkbox"/> Deep breathing |
| <input checked="" type="checkbox"/> General Knowledge | <input checked="" type="checkbox"/> Nodding head up and down |
| <input checked="" type="checkbox"/> Care and practical use | <input checked="" type="checkbox"/> Turning head side to side |
| <input checked="" type="checkbox"/> Repair and maintenance | <input checked="" type="checkbox"/> Talking |
| <input checked="" type="checkbox"/> limitations | <input checked="" type="checkbox"/> Bending at the waist |

User restrictions:

Fit Tester: _____

Signature _____

Date of fit test: _____ (Certificate expires two years after this date)

Douglas Dye, Program Administrator

10.0 Appendix B – Respirator User Screening Form



Respirator User Screening Form

DEPARTMENT INFORMATION Department: _____ Building: _____
Date: _____
Supervisor: _____ Email: _____
Telephone: _____

RESPIRATOR USER INFORMATION

Name: _____ Email: _____ Telephone: _____

CONDITIONS OF USE

Activities requiring respirator: _____

Frequency of use: Daily Weekly Monthly Yearly

Exertion level during use: Light Moderate Heavy

Duration of respirator use: <15 min 15-60 min >60 min Variable

Temperature during use: <0°C 0°C-25°C >25°C

SPECIAL WORK CONSIDERATIONS

- Emergency escape Rescue operations HAZMAT response
- Riot/police activity Oxygen deficiency Confined spaces
- IDLH Other _____

Other personal protective equipment:

- Additional types of PPE requires (specify): _____
 - Estimated total weight of tools/equipment carried during use: Max: _____ Avg: _____
-

TYPES OF RESPIRATOR USED (check all that apply)

- Tight-fitting Non-tight-fitting (e.g., hood) SCBA – open circuit
- Air-purifying – non-powered Air purifying – powered Other: _____

Continued on reverse



Respirator User Screening Form

RESPIRATOR USER'S HEALTH CONDITIONS

Check yes or no box only. DO NOT specify

(a) Some conditions can seriously affect your ability to safely use a respirator. Do you have, or do you experience any of the following, or other condition that could affect respirator use?

Yes No

- | | | | |
|----------------------------|-------------------------|--------------------|-----------|
| Shortness of breath | Breathing difficulties | Chronic bronchitis | Emphysema |
| Lung disease | Chest pain on exertion | Heart problems | Allergies |
| Hypertension | Cardiovascular disease | Thyroid problems | Diabetes |
| Neuromuscular disease | Fainting spells | Dizziness/nausea | Seizures |
| Temperature susceptibility | Claustrophobia | Fear of heights | Pacemaker |
| Hearing impairment | Panic attacks | Colour blindness | Asthma |
| Vision impairment | Reduced sense of smell | Back/Neck problems | Dentures |
| Reduced sense of taste | Unusual facial features | Skin conditions | |

Other condition(s) affecting respirator use

Prescription medication to control a condition

(b) Have you had previous difficulty while using a respirator? Yes No

(c) Do you have any concerns about your ability to use a respirator? Yes No

A "Yes" answer to (a), (b) or (c) indicates further assessment by a health care profession is required prior to respirator use.

Signature of respirator user: _____ Date: _____

HEALTH CARE PROFESSIONAL PRIMARY ASSESSMENT (if required)

Assessment date: _____ Respirator use permitted: Yes No Uncertain

Referred to medical assessment: Yes No

HCP Name: _____ Signature: _____

MEDICAL ASSESSMENT (if required)

No restrictions Respirator use NOT permitted Some restrictions (specify) _____

Name of physician: _____ Signature of Physician: _____

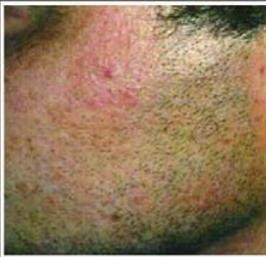
11.0 Appendix C – Acceptable and Unacceptable Facial Hair

Illustrations of acceptable and unacceptable facial hair for tight-fitting respirators

Notes:

- (1) *The examples provided in this appendix are illustrations of the application of the criteria specified in the Standard. These examples are limited, not comprehensive, and are provided only as guidance for program administrators, fit testers, supervisors, and users. Variations not illustrated in this Annex do not necessarily meet the criteria for acceptable facial hair.*
- (2) *Acceptable facial hair for respirator fit testing and use does not interfere with*
 - (a) *the respirator sealing surface; or*
 - (b) *valve or respirator function.*

Acceptable

<p>A. Clean-shaven, ideal for a good seal</p>	
<p>B. Amount of facial hair that will typically allow a good seal</p>	
<p>C. Moustache that does not interfere with the sealing surface, valves, or respirator function</p>	
<p>D. Soul patch that does not interfere with the sealing surface, valves, or respirator function</p>	

Unacceptable

<p>E. Soul patch that will interfere with the respirator seal in the chin area on elastomeric facepieces</p> <p>Facial hair and sideburns that will interfere with the sealing surface</p>	
<p>F. This facial "shadow" (not clean-shaven) will interfere with the sealing surface of a half or full facepiece. It will also compromise a secondary seal inside a tight-fitting hood-style respirator.</p> <p>Degradation of fit can occur during cumulative work hours when an individual grows this amount of facial hair.</p>	
<p>G. Moustache is too thick and too long (down around edge of mouth); will contact a sealing surface and interfere with exhalation valve.</p> <p>Sideburns and/or heavy hair under the chin will prevent a good seal.</p>	
<p>H. Moustache is too thick and too long (down around edge of mouth); will contact a sealing surface and could get stuck in an exhalation valve.</p> <p>The hair on the rest of the face will interfere with a sealing surface.</p>	
<p>I. Hair is in sealing region and under the chin.</p> <p>Hair is in chin cup sealing region and on the side of the face.</p>	
<p>J. Moustache is too thick and too long; will contact a sealing surface and interfere with exhalation valve.</p>	

Note: Adapted with permission from Brookhaven Lab.