

### **Campus Safety**

**PERSONAL PROTECTIVE EQUIPMENT (PPE) STANDARD**

# Purpose

This standard addresses the requirements of the Alberta Occupational Health and Safety Act, Regulation and Code 2009 - Part 18 of the Code, “Personal Protective Equipment” and Part 1 of the Act, “Obligations of Work Site Parties.” This standard assists with implementation of the the University of Lethbridge’s Environment, Health and Safety Policy with respect to safety at the work site.

# Scope

This standard applies to the use of personal protective equipment at all University of Lethbridge worksites, including all satellite campuses, any and all facilities used for the conduct of University business and University research locations, inclusive of field locations and applies to all operations and activities conducted under the auspices of the University. This standard also applies to any student conducting work for the University of Lethbridge in an academic or research activity, however in certain cases; students may be required to supply their own PPE.

# STANDARD

1. Selection of PPE shall be conducted by hazard assessment in accordance Part 2 of the Alberta OHS Code, the University’s Hazard Management Standard, and Hazard Assessment and Control Procedures.
2. Once identified in the hazard assessment process, the University of Lethbridge provides required PPE to workers and expects that it be used, and further maintained in a good, reliable and sanitary condition (see Procedures below).
3. The Alberta OHS Code Part 18 – Duty to Use PPE stipulates that PPE including, but not limited to, protective clothing, respiratory devices (respirators), shields, and barriers shall be used where applicable in order to protect workers against chemical, radiological, biological, or physical hazards and irritants capable of causing injury or impairment through absorption, inhalation, or physical contact.

# Responsibilities

**Supervisor Responsibilities**

After performing a hazard assessment and determining that hazards are present, or likely to be present, the supervisor shall do the following:

* Select the types of PPE that a worker / student require to mitigate the dangers and hazards identified in the hazard assessment.
* Ensure the adequacy, proper fit, maintenance, and sanitation of the PPE.
* Communicate selection decisions to each worker / student.
* Ensure every affected worker / student knows correct procedures to use the requisite PPE
* Ensure every affected worker / student uses the required PPE when performing tasks identified in the hazard assessment that mandates the use PPE.
* Prevent the use of PPE that is defective or damaged. Defective or damaged PPE must NOT be used and must be replaced.
* Never assign a task for which PPE is required but not available.

**Worker / Student Responsibilities**

* After a hazard assessment has been performed and hazards identified that require PPE, the worker / student shall do the following:
* Maintain and sanitize PPE which is personally assigned to the individual employee.
* Never perform a task for which PPE is required but not available.
* Always wear and use required PPE correctly.
* Never use PPE that is defective or damaged.
* Turn defective, worn or damaged PPE into Supervisor for replacement.

**Procedure**

1. To comply with Part 2 of the Alberta OHS Code, “Hazard Assessment, Elimination and Control” a **hazard assessment** must be completed, reviewed and/or revised prior to every work assignment, to determine if hazards are present or likely to be present and require the use of PPE and other control measures.
2. **Selection of the appropriate PPE** must meet or exceed the standards set out in Part 18 of the Alberta OHS Code, “Personal Protective Equipment”, or any other applicable standard (see Appendix A) and limited to a reasonable and practicable level deemed appropriate by the individual department.

Any questions or concerns regarding the applicable standard will be forwarded to Safety Services for review and recommendation.

Appendix A  
Personal Protective Equipment Standards

**Body and Limb Protection**

Body protection shall be worn by employees to prevent skin exposure to harmful contaminates (i.e. harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors), limit contamination of "street clothing," and aid the decontamination process.

Selection of appropriate body protection must be based on the hazards identified, parts of the body affected, level of protection needed, duration of use and fit. Protective clothing may include lab coats, long pants, long sleeves, aprons, and footwear.

If a worker may be exposed to a flash fire or electrical equipment flashover, an employer must ensure that the worker wears flame resistant outerwear and uses other protective equipment appropriate to the hazard. A worker must ensure that clothing worn beneath flame resistant outerwear and against the skin is made of flame resistant fabrics or natural fibres that will not melt when exposed to heat.

**Laboratory PPE**

PPE must be worn when working with laboratory hazards (chemical, biological, and radioactive materials). At a minimum this must include laboratory coats (or other protective clothing such as aprons, scrubs, coveralls), safety glasses or goggles, gloves resistant to the material used and appropriate footwear (closed at the heel and toe).

Other protective equipment, such as splash goggles, face shields, aprons, thermal or cut resistant gloves, hearing protection, or respirators, must be worn when conditions dictate.  
  
In a class situation, students shall purchase or obtain the necessary and approved PPE designated by the department or instructor responsible for the course. Students must be trained in the proper usage and care of the PPE.

* Lab coats must provide protection from hazards present in the lab (e.g. fire protective lab coats should be used when handling pyrophoric materials).
* Disposable lab coats should not be worn near any source of ignition, these are generally made of polypropylene which melts onto the skin if heated or burned.
* Lab coats should always be fastened when worn and should have snap closures to allow for quick removal if needed.
* Lab aprons should be fire-resistant, chemical-resistant and easily washed.
* Shoes should cover the entire foot. Sandals or open-toed shoes should not be worn.
* Safety shoes or boots may be required in labs with heavy equipment or materials.
* In clean-rooms or biohazard labs, additional protective clothing is required, including full-body suits, head/hair and shoe coverings.
* Laboratory clothing should not be stored with street clothing, and in some cases, should be decontaminated prior to laundering or subsequent use.

Specific requirements for PPE are provided in the following sections.

**Eye Protection**

*Applicable Standards: CSA Z94.3; ANSI Standards Z87.1*

Protective eyewear shall be worn in any situation where there is a potential for damage to the eye.

Examples of activities that may present eye hazards are:

1. Sparks, open flame and spatters
2. Molten metals
3. Research activities involving high energy, the possibility of flying particles, explosion or implosion of vessels
4. Hazardous chemicals
5. Wood or metal processing, particularly grinding, welding, chipping, sawing and sanding
6. Injurious radiant energy, for example, welding, ultra-violet light, lasers and brazing

These situations require protection from flying debris, protection from chemical splashes, and protection from hazardous radiation such as lasers or ultraviolet light such as that often produced in welding operations. It is critical that the proper protective eyewear be selected for use.

Protective eyewear must offer appropriate protection from the hazards presented. For example, safety glasses do not offer sufficient protection from chemical splashes.  Goggles or safety shields are indicated for that use. When dealing with chemical splashes, be sure the eyewear offers NO opportunity for chemical entry, such as often occurs with poorly placed ventilation holes.

In the case of protection from radiation, including and especially lasers, the eyewear must not only address the specific wavelength of the radiation but also offer sufficient protection from the power or intensity of the radiation. Eye protection must comply applicable standards.

Supervisors shall explain the reasons why eye protection equipment should be worn and it will be their responsibility to ensure that students, staff and visitors are provided with appropriate eye protection.

Basic care for safety eyewear:

* Clean safety eyewear daily and follow the manufacturer's instructions while doing so, take care not to scratch lenses as this may decrease their effectiveness.
* Store eyewear in a clean, dry place where they are not in danger of falling or being stepped on.
* Replace scratched, broken, bent or ill-fitting eyewear as soon as possible.

An eye safety selection guide is provided on the following page.

| ***Eye safety selection guide*** | | |
| --- | --- | --- |
| ***Type*** | ***Illustration*** | ***Recommended for*** |
| Safety glasses with side shields | Safety goggles with side shields | Protection from flying particles: from front or side |
| Goggles with regular ventilation | Goggles with regular ventilation | Protection from dusts, sparks, and flying particles coming from many angles |
| Goggles with hooded ventilation | Goggles with hooded ventilation | Protection from chemical splashes, dusts, sparks, and flying particles coming from many angles |
| Face shields (used with other eye protection | Face shields | Face protection from: splashes, heat, glare, and flying particles when worn over safety glasses or goggles. Face shields alone do not provide adequate eye protection |

**Foot Protection**

*Applicable Standards: CSA Standard Z195; ASTM Standard F2413*

Appropriate protective footwear shall be worn by employees when exposed to hazards to the foot such as crushing hazards caused by falling or rolling objects, unstable or uneven ground, objects piercing the sole, electrical shock hazards and chemical hazards. Protective footwear will be chosen according to hazards present in that department or employee’s tasks, and comply with the previously listed standard.

**Industrial Headwear**

*Applicable Standards: CAN/CSA Standard Z94.1; ANSI Standard Z89.1; U.S.A. Federal Motor Vehicle Safety Standard FMVSS 218; BSI Standard BS 6658: 05; Snell Memorial Foundation Standard M2005.*

When there is a foreseeable danger of injury to a worker’s head at a work site and there is a significant possibility of lateral impact to the head, the UofL must ensure that the worker wears industrial protective headwear that is appropriate to the hazards and meets the requirements of applicable standards.

The UofL must ensure that a worker riding an all‐terrain vehicle, snow vehicle or a small utility vehicle at a work site wears a safety helmet also approved to one of the previous standards. This does not apply to small utility vehicles equipped with seat belts and rollover protection.

Protective headwear in good condition that meets the requirements of an earlier version of a standard listed may be used unless it is damaged.

**Respiratory Protective Equipment**

*Applicable Standards: CSA Standard Z94.4; Table 1 of CSA Standard Z180.1*

Respiratory protection shall be utilized by employees when exposed to contaminated breathing air that could cause occupational diseases (harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors). Respiratory protective equipment used at a work site is selected in accordance with the standards above.

Respiratory hazards can include airborne contaminants such as dusts, mists, fumes, gases, or oxygen-deficient atmospheres. The University's Respirator Protection Program aims to protect the health and safety of University workers, students and visitors from atmospheric contaminants.

**Training**: All employees that are required to wear a respirator, and supervisors that require their employees to wear a respirator, must undergo training to become competent respirator users.

**Refer to the Respiratory Protection Code of Practice on the Safety Services webpage for more information on selection of respirators and training.**

**Hearing Protection**

*Applicable Standards: CSA standard Z94.2*

Hearing protection should be used by employees exposed to noise levels of 75 decibels or greater. Hearing protection must be worn by employees exposed to noise levels of 85 decibels or greater. The selected hearing protector must be capable of keeping noise exposure at the ear below the occupational exposure limit for noise as outlined in the Alberta OHS code Part 16 “Noise Exposure” and comply with the standard above.

If noise levels exceed 85 dB, engineering or administrative controls are required to reduce the risk of occupational noise-induced hearing loss. If harmful noise levels are suspected (e.g. if it is difficult to carry on a conversation), contact Safety Services for an assessment. Sound measurements will be taken to recommend the method and amount of attenuation required, as well as the types of hearing protection.

**Training**: All employees that are required to wear hearing protection and supervisors that require their employees to wear hearing protection, must undergo training to become competent hearing protection users. Noise exposed worker must undergo audiometric testing.

**Refer to the Noise Management and Hearing Conservation Program on the Safety Services webpage for more information on selection of hearing protection and training.**

**Types of hearing protectors**

|  |  |  |
| --- | --- | --- |
| **Disposable earplugs**  **Disposable earplugs** | **Custom earplugs**  **Permanent earplugs** | **Earmuffs**  **Earmuffs** |

**How to properly fit ear plugs**

1. Before fitting any ear plugs, make sure your hands are clean.
2. Hold the ear plug between your thumb and forefinger. Roll and compress the entire ear plug to a small, crease-free cylinder.
3. Use your other hand to reach over your head and pull up and back on your outer ear. This straightens the ear canal, making way for a snug fit.
4. Insert the ear plug and hold for a few seconds. This allows the ear plug to expand and fill the ear canal. When properly inserted, the ambient sound level should drop as the earplugs expand. If you can cup your hands over your ears and the noise seems to decrease, your ear plugs are probably not fitted properly. Remove and refit following instructions.
5. Always remove ear plugs slowly, twisting them to break the seal.

**Hand Protection**

Appropriate hand protection shall be worn employees when exposed to hazards of the hand, such as skin absorption of harmful substances, severe cuts or lacerations, severe abrasions, punctures, chemical burns, thermal burns, and harmful temperature extremes. Selection of appropriate hand protection shall be based on the hazards identified, level of protection needed, duration of use, dexterity required and fit.

**Selection of chemical resistant gloves**

Gloves reduce the exposure of our hands to hazardous materials. No single material will protect against all chemicals, so glove selection must be made for each type of chemical. Latex gloves may provide adequate protection against dilute aqueous solutions, they however provide no protection against exposure to solvents. The table below is intended as a guideline for selection of the appropriate protective glove. **Manufacturers can supply specific information on the choice of glove for specific applications.**

**Glove selection should be based on the following criteria:**

**Degradation**

Degradation due to contact with chemicals causes the glove material to soften, swell, shrink, stretch, dissolve, or to become hard and brittle.

**Permeation**

Permeation is the result of molecular diffusion of a chemical through a glove material. There may be permeation without obvious signs of degradation. Permeation is quantified by breakthrough time and permeation rate.

|  |  |
| --- | --- |
| ***Breakthrough time*** | The time it takes for a particular chemical to pass through a protective material. |
| ***Permeation rate*** | The speed at which the chemical moves through the protective material once it has broken through. |

**Exposure**

Glove performance decreases significantly as chemical exposure increases by:

* Chemical concentration
* Direct immersion
* Previous exposures

**Temperature**

Permeation test data are obtained at room temperature (20 to 25 degrees Celsius). If chemicals are being used at temperatures higher than this glove performance may be significantly affected.

**Glove thickness**

Any chemical will permeate a protective material given enough time. The breakthrough time for a thicker material will be longer than that of a thinner material, providing superior chemical resistance. When choosing a chemical resistant glove manual dexterity must also be taken into account.

**Manufacturer**

Differences in production of materials results in variations of permeation and degradation between manufacturers. Test data for a particular manufacturer should be consulted prior to selecting a chemical resistant glove.

**Chemical purity**

Permeation testing is conducted using pure chemicals. Mixtures of chemicals will significantly alter the permeation rate and degradation of a material.

**Physical resistance**

Chemical penetration through a tear or hole in a glove will cause a much greater chemical exposure potential than caused by molecular permeation.

**Selection guide**

**This guide is for general reference only**, for specific recommendations refer to Safety Data Sheets (SDS) and contact the glove manufacturer or Safety Services.

| ***Gloves*** | ***Material*** | ***Chemical resistance*** | |
| --- | --- | --- | --- |
| ***Recommended*** | ***Not recommended*** |
| Latex | Natural rubber | Weak acids, weak bases, alcohols, aqueous solutions | Oils, greases and organics |
| Butyl | Synthetic rubber | Aldehydes, ketones, esters, glycol ethers, polar organic solvents | Aliphatic, aromatic and chlorinated  solvents |
| Neoprene | Synthetic rubber | Oxidizing acids, bases, alcohols, oils, fats, aniline, phenol, glycol ethers | Chlorinated solvents |
| Nitrile | Synthetic rubber | Oils, greases, acids, caustics, aliphatic solvents | Aromatic solvents, many ketones, esters and many chlorinated solvents |
| PVA | Poly-vinyl alcohol | A wide range of aliphatic, aromatic and chlorinated solvents, ketones (except acetone), esters, and ethers | Acids, alcohols, bases and water |
| PVC | Poly-vinyl chloride | Strong acids, and bases, salts, other aqueous solutions, alcohols, glycol ethers | Aliphatic, aromatic and chlorinated solvents, aldehydes, ketones, nitro compounds |
| Viton | Fluoroelastomer | Aromatic, aliphatic and chlorinated solvents, and alcohols | Some ketones, esters and amines |
| Silver shield | Laminate | Wide range of solvents, acids and bases |  |

**Note that the glove manufacturer’s selection guide should ALWAYS be consulted when choosing the right glove for the job.** Some examples areprovided below.

* [Best gloves](http://www.bestglove.com/)
* [Ansell](http://www.ansell-edmont.com/)

**Life Jackets and Personal Flotation Devices**

*Applicable Standards: CGSB Standard CAN/CGSB 65.7‐M88 AMEND; GSB Standard CAN/CGSB 65.7‐M88 AMEND*

If there is a foreseeable danger that a worker could be exposed to the hazard of drowning, the UofL must ensure that the worker wears a life jacket, or have a personal flotation device on hand. A life jacket or flotation device must meet requirements of applicable standards.

# RESOURCES

* [Alberta OHS Act, Regulation and Code](https://www.alberta.ca/ohs-act-regulation-code.aspx)
* [University of Waterloo PPE Program](https://uwaterloo.ca/safety-office/programs-and-procedures/personal-protective-equipment)

# RELATED DOCUMENTS

* [Laboratory Chemical Safety and Procedures Manual](http://www.uleth.ca/risk-and-safety-services/content/safety-0)
* Respiratory Protection Code of Practice
* Noise Management and Hearing Conservation Program