Emergency Showers and Eyewash Stations Safety Program

1. Scope

The Emergency Showers and Eyewash Stations Safety Program provides the following information regarding emergency showers and emergency eyewash stations:

- Legislative requirements
- Responsibilities
- Concordia's standards for emergency showers and emergency eyewash stations
- Maintenance requirements
- Accessibility requirements

2. Definitions

ANSI: The American National Standards Association.

Emergency shower: A facility used, or intended to be used for, the rinsing and/or decontamination of body areas in the event of chemical exposure.

Emergency eyewash station: A facility used, or intended to be used for, the rinsing and/or decontamination of the eyes in the event of chemical exposure or particulate in the eyes.

Eyewash bottle: A bottle, complete with flushing solution, whose design, construction and manufacture enables the quick flushing of an eye and surrounding facial area.

Self-contained eyewash station: A station where eyewash bottle(s) and/or a supplemental eyewash facility are located to enable initial and/or supplemental flushing of the eye(s) and surrounding facial area.

3. Legislation

Requirements for providing access to emergency showers and emergency eyewash stations are stated in the following sections of the *Regulation Respecting Occupational Health and Safety (Quebec)*:

75. Emergency showers and eyewash fountains shall be put at the disposal of workers in the following circumstances:

(1) when a corrosive substance or other dangerous substance is likely to rapidly cause serious or irreversible damage to the skin or eyes of workers.

(2) when a toxic substance is likely to be rapidly absorbed by the skin or the eyes and cause them to have serious irritations.

In other cases, equipment for rinsing eyes and washing skin, such as showers, portable showers, eyewash fountains or any other type of plumbing shall be put at the disposal of workers, according to the nature of the dangers to which they are exposed. Such equipment shall be located near the work station of the exposed workers.

76. Emergency showers and eyewash fountains referred to in the first paragraph of section 75 shall be clearly identified and easily accessible. In addition, they shall be located within the immediate vicinity of exposed workers and supplied with warm water.

Water from showers supplied by a drinking water network as well as water supplying portable showers shall be regularly changed to ensure its safety.

The warm water supply only applies to showers installed or modified after August 2, 2002.

Currently, there are no Canadian or Quebec standards for the design or placement of emergency shower and/or eyewash stations. As a result, the *American National Standards Institute (ANSI) Standard Z358.1-2014 "Emergency Eyewash and Shower Equipment"* is used as a guide. The *ANSI Z358.1-2014 SAFETY EQUIPMENT: MINIMUM PERFORMANCE CHECKLIST (provided by Haws Corporation)* is included in Appendix I.

4. Responsibilities

a. Facilities Management

Facilities Management is responsible for:

- Ensuring that all emergency showers and emergency eyewash stations installed meet the specifications outlined in this program.
- Ensuring that all emergency shower and emergency eyewash stations meet the operational and maintenance specifications outlined in this program.

b. Area Supervisors

Supervisors of areas where emergency shower and emergency eyewash stations are provided are responsible to ensure that emergency eyewash stations are maintained in accordance with the maintenance specifications outlined in the program. They must also provide all staff/students under their supervision with instruction in the proper use and location of emergency showers or eyewash stations before any emergencies occur.

c. Environmental Health and Safety

Environmental Health and Safety (EHS) is responsible for conducting risk assessments in order to determine if a work area requires an emergency showers and/or emergency eyewash.

5. Concordia's Emergency Shower and Emergency Eyewash Station Standards

a. Dimensions

The following are the dimensions and measurements requirements:

i. Emergency showers

- Showerhead must be 82 to 96 inches (208.3 cm - 243.8 cm) above surface floor of user;
- Shall be designed so that the flushing flow remains on without the use of the operator's hands;

- The valve shall be simple to operate and go from “off” to “on” in one second or less and actuator cannot be more than 69 inches (173.3 cm) from surface floor of user.

ii. Emergency eyewash stations

- Must provide a means of controlled flow to both eyes simultaneously at a velocity low enough to be non-injurious.
- Outlets shall be protected from airborne contaminants.
- The flushing fluid of an eyewash shall cover the areas between the interior and exterior lines of a gauge at some point less than 8 inches (20.3 cm) above the eyewash nozzle.
- Flushing fluid flow pattern should be 33 to 53 inches (83.8 cm – 134.6 cm) from floor and minimum of 6 inches (15.3 cm) from wall.
- Is designed so that the flushing flow remains on without the use of the operator’s hands. The valve shall be simple to operate and go from “off” to “on” in one second or less.

b. Water Flow

i. Emergency showers

- The minimum volume of spray should be 75.7 litres/minute (20 gallons/minute) for a minimum time of 15 minutes and provide a column of water 20 inches (50.8 cm) wide at 60 inches (152.4 cm) above the surface floor of user

ii. Emergency Eyewash stations

- Must deliver fluid to both eyes simultaneously at a volume of not less than 1.5 litres/minute (0.4 gallons/minute) for 15 minutes.

Piping should be installed no smaller than the inlet size of the unit, and at least 30 psi dynamic pressure should be available for the equipment. The ideal pressure for a shower or eyewash is between 30 and 90 psi.

c. Water Temperature

The water supplied by both emergency showers and emergency eyewash stations must be "tepid"; between 16-38°C.

Temperatures higher than 38°C are harmful to the eyes and can enhance chemical interaction with the skin and eyes. If the water is too hot the biological response is for pores in the skin to open, potentially causing increased contaminant absorption. Excessively hot water may also cause severe scalding and trigger an increased chemical reaction.

Long flushing times with cold water (less than 16°C) can cause hypothermia and may result in not rinsing or showering for the full recommended time; if the water is too cold, a worker exposed to the hazardous material is unlikely to stay in long enough for a medically effective decontamination.

d. Drench Hoses

Drench hoses (Figure 1) may supplement but may not be used in place of dedicated eyewash units. They may be used to "spot" rinse an area when a full shower is not required to assist a victim when

the victim is unable to stand or is unconscious, or to wash under a piece of clothing before the clothing is removed. A drench hose is not a substitute for a safety shower as its flow rate is much less than the one of safety shower. However, a dual head eyewash drench hose may be considered an eyewash, if the drench hose meets the performance requirements as listed in the standard (see Appendix I).

Figure 1: Examples of typical drench hose and dual head eyewash drench hose

e. Location & Signage

A person must be able to reach an eye wash and/or emergency shower station in no more than 10 seconds. Consideration needs to be given to the fact that the person will be injured and may have limited vision. An average person can usually walk 16 to 17 metres in 10 seconds.

However, the "10 second" rule may be modified depending on the potential effect of the chemical. Where a highly corrosive chemical is used, an emergency shower and/or eyewash station may be required within 3-6 metres from the hazard. These units should be installed in a manner in which they do not become contaminated from corrosive chemicals used nearby.

The location of each emergency shower and/or eyewash station must be identified with highly visible signage. The signage must be in the form of a symbol that is universal so that it is understood in all languages, see Figure 2 for the university`s established signage for emergency showers and emergency eyewashes. The location should be well lit.

Figure 2: Concordia's official emergency shower and emergency eyewash signage

Other recommendations include that the emergency shower and/or eyewash station should:

- be located as close to the hazard as possible;
- not be separated by a partition from the hazardous work area;
- be on an unobstructed path between the workstation and the hazard; workers should not have to pass through doorways, weave through machinery or other obstacles to reach the station; As a specification, a door is considered to be an obstruction. Where the hazard is not corrosive, one intervening door can be present so long as it opens in the same direction of travel as the person attempting to reach the emergency eyewash and shower equipment and the door is equipped with a closing mechanism that cannot be locked to impede access to the equipment.
- be located where workers can easily see the station - preferably in a regular trafficked area;
- be on the same floor as the hazard (no stairs to travel between the workstation and the emergency equipment);
- be located near an emergency exit whenever possible so the responding emergency personnel can reach the victim easily;
- be located in an area where further contamination will not occur;
- provide a drainage system for the excess water (however, the water may be considered hazardous waste and special regulations may apply);
- not come into contact with any electrical equipment that may become a hazard when wet, and;
- be protected from freezing when installing emergency equipment outdoors.

It is common in many laboratory buildings to install emergency equipment in a corridor or hallway, outside of the lab room. Since a door may be considered an obstruction (see above), these types of set-ups may violate the provisions of the ANSI standard.

6. Water Disposal

There are no requirements regarding the disposal of waste water. However, careful considerations to potential environmental contamination, building damages and other hazards (e.g. slippery floors) shall be considered prior connecting an eyewash/shower unit to a drain.

7. Risk Assessment

Work areas that normally require these devices include:

- Laboratories;
- Workshops and studios;
- High dust areas;
- Areas where dipping operations are performed;
- Hazardous substances dispensing areas;
- Any other areas where hazardous and corrosive substances are handled, dispensed or stored showing a potential splash risk

The following table provides selection and location for emergency washing facilities based upon a general risk assessment. **However, EHS must always be contacted for a proper risk assessment prior installing any emergency eyewash and/or shower station.**

	High Risk	Medium Risk	Low Risk
Hazards	Corrosive chemicals or other materials are stored or used in a manner, concentration and quantity that presents a risk of irreversible tissue damage to the eyes or skin, or of serious illness resulting from rapid absorption of a toxic substance through the eyes or skin, or where the work activity presents a risk of ignition of the clothing.	Chemicals or materials are stored or used in a manner, concentration and quantity that present a risk of irritation or other reversible harm to the eyes or skin, or of illness resulting from absorption of a toxic substance through the eyes or skin.	Workplaces where chemicals or other materials are used in a manner and quantity that presents a risk of mild eye or skin irritation.
Examples	Handling corrosive chemicals Disinfecting equipment Filling chemical storage batteries	Handling irritant chemicals Solvent degreasing equipment Handling solvents	Welding and grinding Working in dusty areas Handling diluted chemicals
Eyewash	Continuous flow eyewash facility with a minimum duration of at least 30 minutes. Located as close as reasonably possible within the same storage or work area.	Continuous flow eyewash facility with a minimum duration of 15 minutes. Located on the same level as the hazard, within 10 sec reach with a pathway be free of obstructions.	Effective means to flush the eyes such as sink, drench hose, personal eyewash bottle. Located within 10 seconds walking at a normal pace.
Shower	Continuous flow emergency shower facility with a minimum duration of at least 30 minutes.	Continuous flow emergency shower facility with a minimum duration of 15 minutes.	Emergency flushing equipment.

8. Maintenance

a. Emergency Eyewash Stations

i. Weekly Maintenance

Weekly activation of the emergency shower and/or eyewash station is recommended. A weekly check will make sure there is flushing fluid available and clearing the supply line of sediments and minimize microbial contamination caused by 'still' or sitting water.

Individuals in each work area should have a designated individual responsible for the weekly testing and inspection of the eyewash unit. These individuals are responsible to perform the maintenance and keep an updated written record (please refer to **Appendix II** for a template of activation log) and tag on the unit and responsible for advising EHS and/or Facilities Management (X2400) of any deficiencies.

Each station is to be run for at least 2 minutes, activating water flow by depressing the eyewash control. If the eyewash station is plumbed directly into drain, ensure proper flow. However, if the eyewash station is not plumbed directly into drain, use a bucket or activate into the sink.

The weekly maintenance checklist must also include the following items:

- Equipment is installed within 10 seconds from the hazard and on the same plane as the hazard;
- Pathway is clear of obstructions;
- Equipment is free of broken or missing parts;
- Outlets are protected from airborne contaminants;
- Valve actuator must stay on (unless manually turned off);
- Controlled and equal flow of flushing fluid must be provided to both eyes simultaneously.

Please refer to Appendix I concerning testing requirements. Appendix II can be used as an eyewash activation log template; it should be located close to the eyewash and filled in after every activation.

ii. Annual Maintenance

Maintenance on the University's emergency eyewash stations is performed on a yearly basis by Facilities Management. The annual inspection must verify the following items:

- Controlled, low velocity flow rinses both eyes and is not injurious to user.
- Water flow is sufficiently high to allow user to hold eyes open while rinsing.
- Spray heads are protected from airborne contaminants. Covers are removed by water flow.
- Unit delivers at least 1.5 liters of water per minute.
- Water flow pattern is positioned between 83.8 cm and 134.6 cm from the floor and at least 15.3 cm from the wall or nearest obstruction.
- Hands-free stay-open valve activates in one second or less.
- Valve actuator is easy to locate and readily accessible to user.
- Unit washes both eyes simultaneously. Water flow covers flush area at no more than 20.3 cm above spray heads.
- Water temperature is between 16°C – 38°C.

Always ensure that Facilities Management is aware of any new emergency shower and/or eyewash station installations in your work area.

b. Emergency Showers

i. Annual Maintenance

Maintenance on the University's emergency shower and/or eyewash stations is performed on a yearly basis by Facilities Management. The annual inspection must verify the following items:

- Water supply delivers required flow when shower and eye or eye/face wash are operated simultaneously.
- Hands-free stay-open valve activates in one second or less.
- Height of water column is between 208.3 cm and 243.8 cm above the floor.
- Shower delivers 75.7 liters of water per minute.
- Easily located, accessible actuator is no more than 173.3 cm above floor.
- Center of the water pattern is at least 40.6 cm from any obstruction.

- At 152.4 cm above the floor, the water pattern is at least 50.8 cm in diameter.
- Water temperature is between 16°C – 38°C.

9. Eyewash Bottles and Self-Contained Eyewash Stations

Eyewash bottles and self-contained eyewash units (Figure 3) supplement plumbed and self-contained stations, but in no way can replace them. They are portable and permit immediate flushing of contaminants or small particles. They usually contain a buffered, saline solution that is sterile and superior to tap water for emergencies. However, since the fluid supply lasts for only a short period of time, they may not able to wash the eyes sufficiently.

The main purpose of such a unit is to supply immediate flushing. Once accomplished, the user should proceed to an emergency shower and/or eyewash station and flush for the required flushing/rinsing period.

These portable eyewash units require ongoing maintenance. When the bottles or units are filled with a buffered saline solution, this solution must be replaced upon its expiry date (always refer to the recommendations of the saline solution supplier). Outdated solutions can lose their effectiveness, as the agents used to control bacterial growth are only effective for a limited time.

Figure 3: Examples of self-contained eyewash and eyewash bottle stations

If the bottles or units are filled with tap water instead of a buffered saline solution, the water must then be changed every week. Any portable eyewash equipment should also be inspected and maintained according to the manufacturer's instructions or at least annually for overall operation.

All portable eyewash units (bottles or self-contained) are not included in the yearly maintenance schedule of Facilities Operations. Therefore, the proper maintenance should be provided by the laboratory, studio or workshop users.

10. Usage Instructions

Emergency showers and emergency eyewash stations are installed with the ability of providing flushing liquid for a minimum of 15 minutes.

The flushing or rinsing time may vary according to the nature and properties of the chemical:

- a minimum 5-minute flushing time is recommended for mildly irritating chemicals;
- at least 20 minutes for moderate-to-severe irritants or unknown chemicals;
- 20 minutes for non-penetrating corrosives (e.g. most acids);
- at least 60 minutes for penetrating corrosives (e.g. bases, phenol, hydrofluoric acid)

Eye washing with contact lenses in place will not clear a splashed chemical from the eye. The contact lenses must be removed for effective cleansing.

In all cases, if irritation persists, repeat the flushing procedure and refer to the SDS of the specific chemical. Get medical attention as soon as possible after first aid has been provided.

11. References

- Règlement sur la santé et la sécurité du travail (Loi sur la santé et la sécurité du travail, chapitre S-2.1, a. 223), Gouvernement du Québec
- ANSI Z358.1-2014 Emergency Eyewash and Shower Equipment Standard
- ANSI Z358.1-2014 SAFETY EQUIPMENT : MINIMUM PERFORMANCE CHECKLIST, Haws Corporation, http://www.hawsco.com/
- Canadian Centre for Occupational Health and Safety, www.ccohs.ca
- Haws Integrated Engineered Solutions for Safety www.hawsco.com

Appendix I

(from Haws Integrated Engineered Solutions for Safety ANSI Z358.1 checklist compliance brochure)

ANSI Z358.1 SAFETY EQUIPMENT
ANNUAL MINIMUM PERFORMANCE CHECKLIST

2014 REVISIONS INDICATED IN ORANGE. Requirements for Weekly Testing are Indicated with (w).

☐ All shower units shall be inspected ***annually*** to assure conformance with ANSI Z358.1. Recommended Testing Flow Pressure is 30 psi (+ .5 psi – .0 psi).

LOCATION

☐ Emergency equipment shall be activated ***weekly***.

☐ Safety station shall be accessible within 10 seconds of hazard, approximately 55 ft./16.8 m. *(Sec. 4.5.2, 5.4.2, 6.4.2, 7.4.2)* (w)

☐ Safety station shall be located on the same level as the hazard and the path of travel shall be free of obstructions. *(Sec. 4.5.2, 5.4.2, 6.4.2, 7.4.2)* (w)

☐ Emergency equipment location shall be well lit and identified with a highly visible sign. *(Sec. 4.5.3, 5.4.3, 6.4.3, 7.4.3)* (w)

☐ All employees subject to exposure to hazardous material should be instructed in the location and proper use of emergency equipment. *(Sec. 4.6.4, 5.5.4, 6.5.4, 7.5.4)*

COMBINATION UNIT

☐ Combination unit components shall be capable of operating simultaneously and shall be positioned so that components may be used simultaneously by the same user. (Sec. 7.3, 7.4.4) (w)

DRENCH HOSE

☐ Drench hose must deliver a controlled flow of flushing fluid at a velocity low enough to be non-injurious. (Sec. 8.2.1)

☐ A drench hose can only be considered an eyewash – eye/face wash if it meets performance requirements in Sec. 5 and/or 6.

TEMPERATURE

☐ Deliver tepid flushing fluid.* (Sec. 4.5.6, 5.4.6, 6.4.6, 7.4.5)

**Suggested temperature range – above 60°F (16°C) and below 100°F (38°C).*

SHOWER

☐ Showerhead must be 82 to 96 inches (208.3 cm - 243.8 cm) above the surface floor of user. (Sec. 4.1.3, 7.1)

☐ Shower must deliver minimum of 20 gallons (75.7L) per minute and provide a column of water 20 inches (50.8 cm) wide at 60 inches (152.4 cm) above the surface floor of user. (Sec. 4.1.2, 4.1.4, 7.1)

☐ Shall be designed so that the flushing flow remains on without the use of the operator's hands. The valve shall be simple to operate and go from "off" to "on" in one second or less and actuator can not be more than 69 inches (173.3 cm) from the surface floor of user. (Sec. 4.2, 7.2) (w)

EYEWASH / EYE/FACE WASH

☐ Must provide a means of controlled flow to both eyes simultaneously at a velocity low enough to be non-injurious. (Sec. 5.1.1, 6.1.1, 7.1) (w)

☐ Eye/face wash equipment must deliver minimum of 3 gallons (11.4 L) per minute of water for 15 minutes. (Sec. 6.1.6, 7.1) Eyewash only must deliver minimum of .4 gallon (1.5 L) per minute of water for 15 minutes. (Sec 5.1.6, 7.1)

☐ Outlets shall be protected from airborne contaminants. (Sec. 5.1.3, 6.1.3, 7.1) (w)

☐ The flushing fluid of an eyewash – eye/face wash shall cover the areas between the interior and exterior lines of a gauge at some point less than 8 inches (20.3 cm) above the eyewash nozzle. (Sec. 5.1.8, 6.1.8, 7.1)

☐ Flushing fluid flow pattern should be 33 to 53 inches (83.8 cm – 134.6 cm) from the surface floor of user and minimum of 6 inches (15.3 cm) from wall. (Sec. 5.4.4, 6.4.4, 7.1)

☐ Shall be designed so that the flushing flow remains on without the use of the operator's hands. The valve shall be simple to operate and go from "off" to "on" in one second or less. (Sec. 5.2, 6.2, 7.2) (w)

Appendix II

Eyewash Activation Log

In accordance with *ANSI Z358.1-2014 standard*, please activate the eyewash weekly and record the date, and initial.

MONTH	DAY	INITIAL	MONTH	DAY	INITIAL