Emergency Showers and Eyewash Stations – Fact Sheets



WHY ARE EMERGENCY SHOWERS OR EYEWASH STATIONS IMPORTANT?

The first 10 to 15 seconds after exposure to a hazardous substance, especially a corrosive substance, are critical. Delaying treatment, even for a few seconds, may cause serious injury.

Emergency showers and eyewash stations provide on-the-spot decontamination. They allow workers to flush away hazardous substances that can cause injury.

Accidental chemical exposures can still occur even with good engineering controls and safety precautions. As a result, it is essential to look beyond the use of goggles, face shields, and procedures for using personal protective equipment. Emergency showers and eyewash stations are a necessary backup to minimize the effects of accident exposure to chemicals.

Emergency showers can also be used effectively in extinguishing clothing fires or for flushing contaminants off clothing.

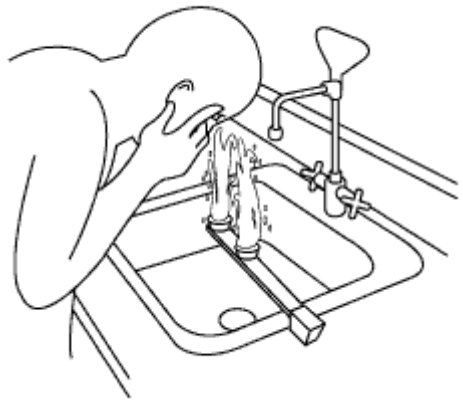
What does the law say?

Consult your local occupational health and safety agency in your jurisdiction and check relevant legislation for any requirements to install this equipment. Currently there is no Canadian standard for the design or placement of eyewash stations or emergency showers. As a result, the American National Standards Institute (ANSI) Standard Z358.1-2014 “Emergency Eyewash and Shower Equipment” is generally used as a guide.

What is a ‘flushing fluid’?

Regulator’s standard defines “flushing fluid” as any of potable (drinking) water, preserved water, preserved buffered saline solution or other medically acceptable solutions. Local laws may apply in some cases. This document will use the term “water” to mean any of these acceptable flushing fluids unless otherwise specified.

How long should the contact area be rinsed/flushed?



Regulators does not specify how long the affected body part should be rinsed. It does specify that the equipment installed according to the standard be capable of providing flushing liquid for a minimum of 15 minutes.

However, other references recommend a minimum 20-minute flushing period if the nature of the contaminant is not known. The flushing or rinsing time can be modified if the identity and properties of the chemical are known. For example:

- 5-minutes for non-irritants or mild irritants,
- 15-20 minutes for moderate to severe irritants and chemicals that cause acute toxicity if absorbed through the skin,
- 30 minutes for most corrosives, and
- 60 minutes for strong alkalis (e.g., sodium, potassium or calcium hydroxide).

In all cases, if irritation persists, repeat the flushing procedure. It is important to get medical attention as soon as possible after first aid has been given. A physician familiar with procedures for treating chemical contamination of the eyes and body should be consulted.

What type of equipment should I install?

Emergency showers are designed to flush the user’s head and body. They should not be used to flush the user’s eyes because the high rate or pressure of water flow could damage the eyes in some instances. Eyewash stations are designed to flush the eye and face area only. There are combination units available that contain both features: a shower and an eyewash.

The need for emergency showers or eyewash stations is based on the properties of the chemicals that workers use and the tasks that they do in the workplace. A job hazard analysis can provide an evaluation of the potential hazards of the job and the work areas. The selection of protection – emergency shower, eyewash, or both – should match the hazard.

In some jobs or work areas, the effect of a hazard may be limited to the worker’s face and eyes. Therefore, an eyewash station may be the appropriate device for worker protection. In other situations, the worker may risk part or full body contact with a chemical. In these areas, an emergency shower may be more appropriate.

A combination unit can flush any part of the body or all of the body. It is the

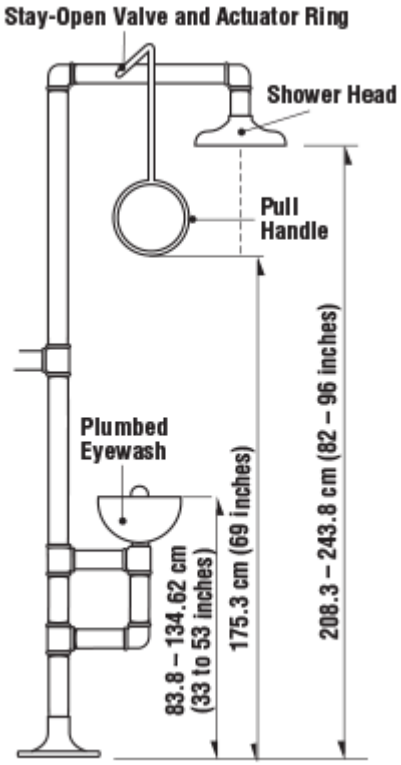
most protective device and should be used wherever possible. This unit is also appropriate in work areas where detailed information about the hazards is lacking, or where complex, hazardous operations involve many chemicals with different properties. A combination unit is useful in situations where there are difficulties handling a worker who may not be able to follow directions because of intense pain or shock from an injury.

What specifications should the equipment meet?

Emergency Showers

The emergency shower should deliver a pattern of water with a diameter of at least 50.8 cm (20 inches) at 152.4 cm (60 inches). This diameter ensures that the water will come into contact with the entire body – not just the top of the person's head. ANSI also recommends the shower head be between 208.3 and 243.8 cm (82-96 inches) from the floor. The minimum volume of spray should be 75.7 litres/minute (20 gallons/minute) for a minimum time of 15 minutes.

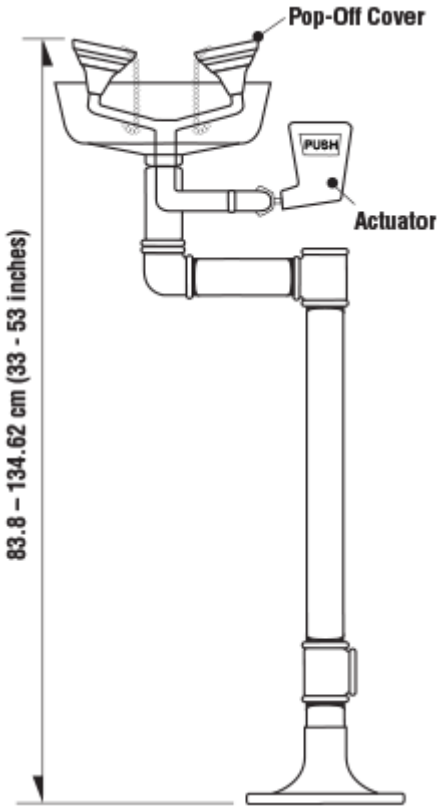
The shower should also be designed so that it can be activated in less than 1 second, and it remains operational without the operator's hand on the valve (or lever, handle, etc.). This valve should not be more than 173.3 cm (69 inches) in height. If enclosures are used, ensure that there is an unobstructed area of 86.4 cm (34 inches) in diameter.



Eyewash and Eye/Face Wash Stations

Eyewash stations should be designed to deliver fluid to both eyes simultaneously at a volume of not less than 1.5 litres/minute (0.4 gallons/minute) for 15 minutes. The combination eye and face wash stations require 11.4 litres per minute (3.0 gallons per minute). However, in either case, the volume should not be at a velocity which may injure the eyes. The unit should be between 83.8 and

134.6 cm (33 to 53 inches) from the floor, and a minimum of 15.3 cm (6 inches) from the wall or nearest obstruction.



With an eye wash station, the user should be able to open their eyelids with their hands and still have their eyes in the liquid. In the case of the eye/face wash, the user should have enough room to allow the eyelids to be held open with the hands while the eyes and face are still in the stream. As with the shower, the unit should also be designed so that it can be activated in less than 1 second, and it remains operational without the operator’s hand on the valve (or lever, handle, etc.) with the valve being located in an easily located place. Since the nozzles to eyewash stations typically need to be protected from airborne contaminants, the units are to be designed such that the removal of these covers should not require a separate motion by the user when the unit is activated.

Self-contained Eye/Face Washes

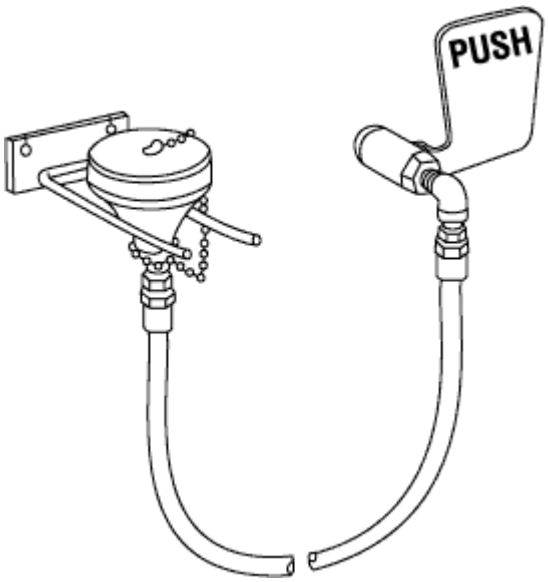
Install and maintain according to the manufacturer’s instructions. Similar requirements apply as with the plumbed units regarding the unit’s ability to provide flushing liquid for at least 15 minutes, accessible access, and to deliver tepid flushing fluid.

Personal Wash Stations

Designed to deliver flushing fluid immediately, personal wash stations can be used while transporting the person to the permanent eyewash station or medical facility. These stations do not replace the requirement to have a 15 minute-supply eyewash station. The expiry date of the fluid should be printed permanently on the unit.

Drench Hoses

Drench hoses may be used to “spot” rinse an area when a full shower is not required, to assist a person when the person is unable to stand or is unconscious, or to wash under a piece of clothing before the clothing is removed. The ANSI standard states that a drench hose may be considered an eyewash or eye/face wash if the drench hose meets the performance requirements as listed in the standard.



Combination Units

This name refers to equipment that shares a common plumbing fixture. Any of the fixtures such as shower, eyewash, eye/face wash or drench hose may be in this combination, but most commonly it refers to a shower and an eye wash station. It is important that pressure and volume requirements for each piece of the unit (as described above) are in compliance with the code.

Where should the emergency equipment be located?

To be effective, the equipment has to be accessible. ANSI recommends that a person be able to reach the equipment in no more than 10 seconds. In practical terms, consider that the person who needs the equipment will be injured, and may not have use of their vision. ANSI notes that the average person can walk 16 to 17 metres (55 feet) in 10 seconds, but this does not account for the physical and emotional state of the person in an emergency.

As such, 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 eyewash station may be required to be closer to the workstation. Check with a professional with knowledge in this area. These units should be installed in such a way that they do not become contaminated from corrosive chemicals used nearby.

The location of each emergency shower or eyewash station should be identified with a highly visible sign. The sign should be in the form of a symbol that does not require workers to have language skills to understand it. The location should be well lit.





Other recommendations include that the emergency shower 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 or weave through machinery or other obstacles to reach them),
- be located where workers can easily see them – preferably in a normal traffic pattern,
- 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 where possible so that any responding emergency response personnel can reach the person easily,
- be located in an area where further contamination will not occur,
- provide a drainage system for the excess water (remember that the water may be considered a hazardous waste and special regulations may apply),
- not come into contact with any electrical equipment that may become a hazard when wet,
- be protected from freezing when installing emergency equipment outdoors.

What temperature should the water be?

The 2014 ANSI standard recommends that the water should be “tepid” and defines this temperature as being between 16-38°C (60-100°F). Temperatures higher than 38°C (100°F) are harmful to the eyes and can enhance chemical interaction with the skin and eyes. Long flushing times with cold water (less than 16°C (60°F)) can cause hypothermia and may result in not rinsing or showering for the full recommended time (ANSI 2014). With thermal burns (injuries to the skin), the American Heart Association (2010) noted that water temperatures of 15-25°C (59-77°F) help to cool the burn and that “cooling reduces pain, edema, and depth of injury”. (However, do not apply ice directly to the skin.)

Remember that any chemical splash should be rinsed for a minimum of 15 minutes but rinsing time can be up to 60 minutes. The temperature of the water should be one that can be tolerated for the required length of time. Water that is too cold or too hot will inhibit workers from rinsing or showering as long as they

should.

Install anti-scalding devices (temperature control valve or thermostatic tempering valve), constant flow meters, and other devices that will help maintain a constant temperature and flow rate. For cold or outdoor locations, emergency showers with heated plumbing are available. In hot climates, outdoor emergency showers should also have a tempering valve so that workers are not exposed to water that is too hot.

What are examples of areas that may require this equipment?

Work areas and operations that may require these devices include:

- Battery charging areas
- Laboratories
- Spraying operations
- High dust areas
- Dipping operations
- Hazardous substances dispensing areas

What other factors should I consider when selecting and using this type of emergency equipment?

The following factors should also be considered as part of a hazard analysis when decisions are being made about the selection and use of emergency showers, eyewash stations or combination units:

Potentially hazardous substances in the immediate work area

All hazardous substances need to be properly identified. A review of safety data sheets (SDSs) and labels can help to evaluate the hazard. To select the appropriate eyewash and shower equipment, you must know about the chemicals you use and their potential risks!

Number of workers in an area with a hazardous substance

More than one emergency shower or eyewash station may be required in an area where many workers use hazardous substances. Evaluate how many workers are using the hazardous chemicals, and provide more equipment where necessary to ensure the each worker’s protection.

Isolated workers

The installation of an audible or visual alarm can alert other workers when the emergency shower or eyewash station is being used. An alarm is especially important if only one worker happens to be working in that area. A person may need help in getting to the eyewash if temporarily blinded. Some companies connect valves electrically to warning lights or buzzers in central areas.

Comfort and warmth

Extra overalls and foot covers should be stored near emergency showers. Clothes contaminated with corrosive or toxic chemicals need to be removed from the injured person. Consider installing a privacy curtain (but remember to maintain the ‘obstacle free’ diameter dimension as stated in the ANSI standard.)

Quality of the Flushing Fluid

Changing the fluid in self-contained systems frequently and cleaning the units regularly can prevent inadvertent use of contaminated fluid. Refer to the manufacturer’s instructions for further details. Even in plumbed eyewash stations, the water may contain contaminants such as rust, scale and chemicals. Systems should be flushed and cleaned regularly.

Neutralized Solutions

It seems logical to neutralize exposure to an acid with a base or vice versa. However, there are concerns that attempts to neutralize chemical contamination of the skin or eyes could increase injury by causing:

- a delay in starting irrigation while first-aid providers search for special irrigating fluids
- thermal burns from the heat given off when the two chemicals react, and
- additional injury due to contact with the neutralizing agent.

As noted in research, there is no clear benefit to using a neutralizing agent instead of water. It is critical that flushing a chemical burn as quickly as possible. Water is readily available in most situations. Follow the chemical manufacturer’s instructions but do not delay treatment to search for a specific solution.

Are there any limitations I should be aware of?

Plumbed Emergency Showers and Eyewash Stations

Studies have shown that despite a general minimum of 15-minute flushing time being recommended, users usually flush exposed body parts five minutes or less. The reasons were always related to the extreme discomfort users experienced using cold water. In cold climates, the water temperature in indoor plumbed systems can be in the 2-7°C (35-45°F) range.

Be sure to maintain the equipment. ANSI suggests a weekly activation to help reduce sediment and/or stagnant water issues.

Portable, Self-Contained Eyewash Stations

Portable, self-contained eyewash stations have a limited amount of fluid. As a result, maintenance is critical to ensure that units are fully charged at all times.

These eyewash stations also require ongoing maintenance of the flushing solution. The agents used to control bacterial growth are effective for certain limited periods of time. Also, small amoebae capable of causing serious eye infections have been found in portable and stationary eyewash stations. Consequently, it is important to monitor the shelf life of the solution and replace the solution when it has expired.



Eyewash Bottles

Eyewash bottles or personal eyewash units 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. However, eyewash bottles are very difficult for the user to handle, especially when alone and when both eyes have been exposed. (e.g., holding the eyelids open while handling the unit is awkward). Also, one bottle cannot flush both eyes simultaneously. Since the fluid supply lasts for only a short period of time, the bottle 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 a self-contained or plumbed eyewash and flush for the required flushing/ rinsing period.

When should equipment be inspected and maintained?

One person in the work area should be designated responsible for inspecting and operating (activating) the emergency shower, eyewash station, combination units, and drench hoses weekly. A weekly activation will help make sure that there is flushing fluid available as well as clear the supply line of sediments and minimize microbial contamination caused by ‘still’ or sitting water. This person should keep a signed, dated record. The ANSI standard also recommends a complete inspection on an annual (yearly) basis.

Preventive maintenance inspections should check for such problems as valve leakage, clogged openings and lines, and adequacy of the fluid volume. A work record of these inspections should be kept. Replacement parts should be kept on hand to prevent the system from becoming non-functional. If the system breaks down for any reason, the workers in the area should be properly warned and protected.

Personal eyewash equipment should be inspected and maintained according to the manufacturer’s instructions and at least annually for overall operation.

What type of training should the workers receive?

All workers require instruction in the proper use and location of emergency showers or eyewash stations before any emergencies occur. It should never be

assumed that workers are already aware of the proper procedures. Written instructions should be made available to all workers and posted beside the emergency shower and eyewash station. Part of the instructional process should include a “hands-on” drill on how to find equipment.

The wearing of contact lenses can be dangerous because chemicals can become trapped under a contact lens. Any delays caused by removing contact lenses in order to rinse eyes could result in injury. Training should include instruction in contact lens removal.

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