- The installation of an audible or visual alarm can alert other workers when the emergency shower or eye-wash fountain is being used. An alarm is especially important if only one worker happens to be working in that area. A victim may need help in getting to the eyewash if temporarily blinded. Some companies connect valves electrically to warning lights or buzzers in central areas.
- 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.
- 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 fountains, the water may contain contaminants such as rust, scale and chemicals. Systems should be flushed and cleaned regularly.
- Eyewash bottles and some portable units cannot supply enough fluid to adequately dilute and wash away contaminants. The use of buffered solutions can improve the efficiency of the portable eyewash because these solutions can increase the first aid potential of the small amount of fluid, and can partially neutralize the contaminant.
- Studies have shown that despite the 15-minute flushing requirement, 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.
- Also, drinkable tap water may not provide the best flushing solution. Tap water may contain many contaminants and could aggravate the injured body part. Some municipal water supplies also contain chlorine which can irritate and leach salt from the eye tissue. As well, tap water may contain rust, scale and chemicals. Running the water continually keeps the water line fresh. Plumbed emergency eyewash fountains should use water that is periodically tested and treated to remove chemical contaminants.
- 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 buffered saline 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.
- One person in the work area should be designated responsible for inspecting and operating (activating) the emergency shower, eyewash fountain, combination units, and drench hoses weekly. This person should keep a signed, dated record. The ANSI standard also recommends a complete inspection on an annual (yearly) basis.
- Personal eyewash equipment should be inspected and maintained according to the manufacturer's instructions and at least annually for overall operation.
- 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. 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.

*** Informations courtesy of CCOHS**

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EMERGENCY SHOWERS & EYEWASH FOUNTAINS

When someone is exposed to a hazardous substance, especially a corrosive one, the first 10 to 15 seconds are critical. Serious injury can occur if that person is not treated immediately. While there is no Canadian standard for eyewash fountains and emergency showers, the American National Standards Institute (ANSI) Standard for Emergency Eyewash and Shower Equipment (ANSI Z358.1-2009) is the industrial standard used in Canada. ANSI states that in any workplace where workers handle or are exposed to hazardous chemicals, eyewash and/or emergency shower stations should be available and easily accessible in case of emergency.

The general rule for placement of the stations is within a 10-second walk (16-17 metres) from where a worker may be exposed to the substance(s). Though in the case of corrosive chemicals, this distance should be closer to 3-6 metres.

Signs should be visible and understandable to everyone, regardless of what language the workers speak. The area around the station(s) should be well lit and free from possible contamination by other substances.

Used properly, eyewash fountains and emergency showers minimize the seriousness of chemical exposure injury. In addition, emergency showers are helpful if clothes catch on fire or become contaminated with chemical. Accidental chemical exposure can still occur even with good engineering controls and safety precautions. It is essential to look beyond the use of goggles, face shields, and procedures for using personal protective equipment.

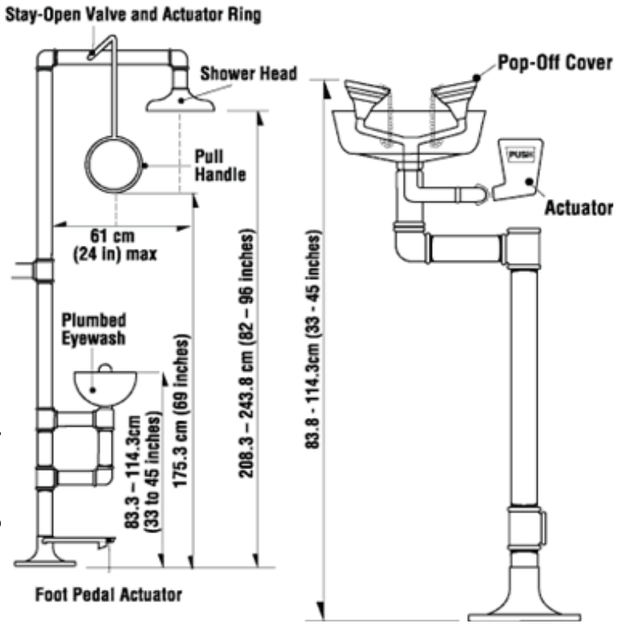
Note: since there is no Canadian standard for emergency showers and eyewash fountains, the U.S. ANSI Standard Z358.1-2009 was used in preparing this document. The ANSI standard defines "flushing fluid" as any of potable (drinking) water, preserved water, preserved buffered saline solution or other medically acceptable solutions.

For emergency showers and eyewash fountains to be effective, the ANSI Standard for Emergency Eyewash and Shower Equipment (ANSI Z358.1-2009) recommends that the affected body part must be flushed immediately and thoroughly for at least 15 minutes using a large supply of clean fluid under low pressure. Water does not neutralize contaminants -- it only dilutes and washes them away. This is why large amounts of water are needed. 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:

- a minimum 5-minute flushing time is recommended for mildly irritating chemicals,
- at least 20 minutes for moderate-to-severe irritants,
- 20 minutes for non-penetrating corrosives, and
- at least 60 minutes for penetrating corrosives.

Non-penetrating corrosives are chemicals which react with human tissue to form a protective layer which limits the extent of damage. Most acids are non-penetrating corrosives. Penetrating corrosives, such as most alkalies, hydrofluoric acid and phenol, enter the skin or eyes deeply. Penetrating corrosives require longer water flushing (a minimum of 60 minutes) than non-penetrating corrosives (a minimum of 20 minutes).

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.



* Image courtesy of CCOHS

Where should 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. 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 fountain may be required within 3-6 metres (10-20 ft) from the hazard. These units should be installed in such a way that they do not become contaminated from corrosive chemicals used nearby.

Emergency Showers

The emergency shower should deliver a pattern of water with a diameter of at least 50.8 cm (20 inches) at 152 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 one 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 Fountains

Eyewash fountains 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. However, the volume should not be at a velocity which may injure the eyes. The unit should be between 83.8 and 114.3 cm (33 to 45 inches) from the floor, and a minimum of 15.3 cm (6 inches) from the wall or nearest obstruction.

The user should be able to open their eyelids with their hands and still have their eyes in the liquid. 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.

Personal Wash Stations

Designed to deliver flushing fluid immediately, personal wash stations can be used while transporting the victim to the permanent eyewash fountain or medical facility. These bottles do not replace the requirement to have a 15 minute-supply eyewash fountain. The expiry date of the fluid should be printed permanently on the unit. Eyewash bottles are very difficult for the user to handle, especially when alone and when both eyes have been exposed.

For example, 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 location of each emergency shower or eyewash fountain 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 fountain 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 victim 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, and
- be protected from freezing when installing emergency equipment outdoors.

What temperature should the water be?

The 2009 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 2009). With thermal burns (injuries to the skin), the American Heart Association noted that optimal healing and lowest mortality rates are with water temperatures of 20-25°C (68-77°F).

Work areas and operations that may require these devices include:

- battery charging areas,
- laboratories,
- spraying operations,
- high dust areas,
- dipping operations, and
- hazardous substances dispensing areas.

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 fountains or combination units:

- All hazardous substances need to be properly identified. A review of material safety data sheets (MSDSs) 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!
- More than one emergency shower or eyewash fountain 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.