

Emergency eyewashes and showers

Proper placement

Eyewash bottles

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MESSAGE FROM THE EDITOR

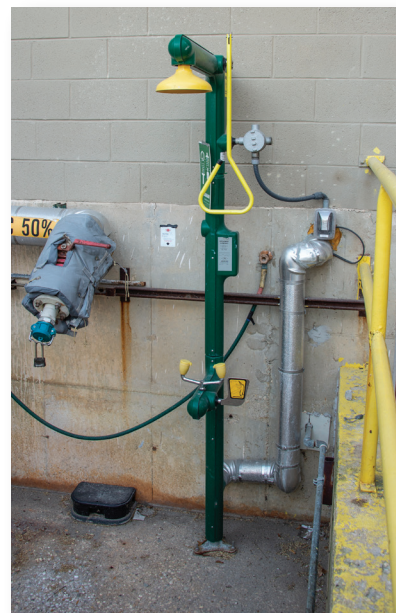
The general rule doesn't always apply if there is no exposure

I've been in many powerhouses, plants, and facilities over my career. It was always a challenge in these workplaces to determine if an emergency eyewash and shower was required. The general rule I think most workplaces follow is that if corrosive materials are present, at least an emergency eyewash is needed. Whether a shower was required or not was too expensive to think about, unless one was already available. Over my career, I encountered many one-offs that didn't fit neatly into this general rule.

If your workplace doesn't already have resources in place, emergency eyewashes and showers can be expensive. In an operating facility like a plant, where budgets are usually very tight, the money to buy equipment may not be immediately available. It must be planned for in future fiscal years. Meanwhile, the workplace could be at risk for an OSHA citation. Willful violation penalties can cost as much as the equipment. I used this thought to help persuade the plant manager to budget for resources that were needed.

One plant manager caught me off guard when he agreed with me that eyewash units and showers were necessary. When he asked me how many were needed and where they needed to be placed, I remembered the general rule mentioned above and told him anywhere there was corrosive materials present. He looked at me with disconcerting eyes and told me to prepare an assessment. At first, I thought to count every place there were corrosive materials in the workplace. As I started counting, I realized that it wasn't realistic because there wasn't always an exposure hazard to workers. My plant manager was smart; she had already told me to perform an assessment.

Once I determined how many eyewash units and showers were needed. I had to figure out things like proper placement, fluid requirements, inspection intervals, and what maintenance is required. OSHA's standard isn't clear at all about how to address these things. For instance, expect to be asked why the workplace can't use eyewash bottles. ♦



Ray Chishti Editor – Workplace Safety

Ray Chishti joined J. J. Keller in 2017 as a Workplace Safety Editor. He has 15 years of total ES&H experience in a variety of industries, including EPC projects, construction, railway, fossil fuel power plants, gas distribution and transmission, electrical transmission, and retail. His experience includes working knowledge in OSHA safety, environmental, HR, workers' compensation, and DOT topics. As a safety professional, his previous roles included auditing and leadership positions with new construction, existing facilities, and large EPC projects valued between one million and two billion dollars. His experience includes positions within law enforcement as a police officer and fraud specialist. His degrees include a Bachelor of Arts (BA) in Law Enforcement, a Master of Business Administration (MBA), and a Juris Doctor (JD)—with a certificate in Occupational Safety and Health.

Do you need an emergency eyewash and shower?

There are times when the use of emergency eyewash and shower equipment becomes crucial in the workplace. In instances where employees are exposed to injurious corrosive materials, OSHA 1910.151(c) requires that employers provide suitable facilities for quick drenching or flushing of the eyes and body within the immediate work area. OSHA provides no additional requirements, and as a result, employers often ask whether or not emergency eyewashes or showers are needed at their facility.

OSHA says in an April 14, 2008 Letter of Interpretation (LOI), that "...the employer must determine if employees can or will be exposed during the course of their duties to hazardous materials in such a way that the protections of an eyewash or emergency shower would be necessary." OSHA expects the employer to determine the level of the potential risk to employees and provide protection accordingly. What protection is proper should be based on a hazard assessment because an employer doesn't *always* need an eyewash or shower just because they have chemicals.

Hazard assessment

OSHA is very clear that employers must provide emergency eyewashes or showers if a person may be exposed to injurious corrosive materials. This seems straightforward; however, since different kinds of chemicals can cause adverse health effects, employers need to fully understand the properties of a chemical and the associated hazards to form a reasoned basis for determining if a chemical is an injurious corrosive material.

First, assess the following:

- **Physical properties** — Chemical liquids present the most common hazards, but solids, gases, vapors, and mists also may present hazards. Material may be considered hazardous if it can damage the skin or eyes or be readily absorbed through the skin.
- **pH** — In general, acids with pH less than 2.5 and alkalis with a pH greater than 11 will require immediate flushing to prevent bodily damage. For

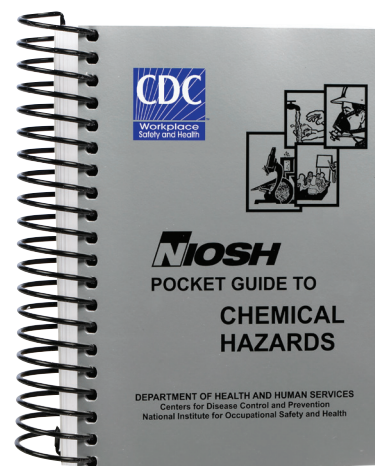
example, alkaline solutions tend to be more damaging to the eyes and skin than acidic solutions because they soak into the tissue. Keep in mind, however, that a pH between those ranges for either the eyes or skin doesn't necessarily mean that a material will not cause injury. For example, there is no known concentration of hydrofluoric acid that is considered "safe." If there is potential for exposure to it at any concentration, immediate flushing is critical.

- **Temperature** — Certain materials can change composition or become volatile when subjected to temperature abuses.
- **Reactivity** — Consider how the chemical can damage the eyes and skin, but also how the chemical may react with other materials or chemicals in the immediate work area.

OSHA says employers should refer to the material's Safety Data Sheet (SDS) when making this evaluation. For example, if the SDS indicates irritation only, an eyewash or shower may not be required. On the other hand, if the SDS states that burns, corneal damage, or blindness could happen, the material would be considered hazardous, and an eyewash and possibly a shower must be provided. The need for a shower should be based on additional evaluations.

Employers should also consult with the product manufacturer and sources such as the NIOSH *Pocket Guide to Chemical Hazards*. The guide lists the physical and chemical properties and health hazards for many different substances. If the entry for the material in question says, "provide quick drench," this would be an indication that an eyewash or shower is needed.

Also, in a May 5, 2004 LOI, OSHA says that employers should consult references such as W. Morton Grant's *Toxicology of the Eye* when considering potential chemical exposures to the eye and the appropriateness of installing eyewashes to protect employees against hazards associated with particular chemicals and substances. ♦



Key to remember: Whether an emergency eyewash and shower is needed in the workplace should be based on a hazard assessment because an employer doesn't *always* need them because they have chemicals present.

Location is everything when placing eyewashes and showers

Regardless of the type of eyewash or shower used, the proper location is important. Each year, OSHA continues to issue citations to employers for emergency eyewash and shower facilities not being near employees. While OSHA doesn't specify the placement of eyewashes or showers in a facility, the standard does say that they must be provided "within the work area for immediate emergency use." What exactly does that mean, though?

Location

The ANSI standard says that emergency eyewashes and shower be located on the same level as the hazard. The more hazardous the material, the closer in time and distance the unit should be. For example, for strong acids or caustics, the unit should be immediately adjacent to the hazard. Still, for substances which are a gas or highly volatile (e.g., anhydrous ammonia) in the presence of water, etc., you should consider locating the eyewash or shower outside the immediate source of exposure as proximity to the source may pose an additional hazard.



Path of travel

The path of travel to an eyewash or shower is critical. If an employee is hindered in some way from either getting to or using the eyewash station, OSHA would likely consider that a violation of the standard.

Specifically, an eyewash and shower should be no farther than a 10 second travel time from the hazard. ANSI says that an average person covers a distance of approximately 55 feet in 10 seconds when walking at a normal pace. The physical and emotional state of the victim should be considered along with the likelihood of personnel in the

immediate area to assist. Bear in mind that a person in need of an eyewash will likely be temporarily blind.

The path of travel to the eyewash or shower has to be clear of obstructions to allow an employee a direct path of travel to the eyewash or shower without impediment.

Obstructions

What exactly does OSHA consider an obstruction to an eyewash or shower?

As OSHA states in a February 27, 2007 Letter of Interpretation, a door is considered to be an obstruction to an eyewash or shower. ANSI further states in its consensus standard that if the hazard is not corrosive, one door can be present so long as it opens in the same direction of travel as the person trying to reach either the eyewash or shower. The door, however, must be equipped with a closing mechanism that cannot be locked to prevent access to the unit.

While stairs aren't specifically addressed, if employees would be required to use stairs to get to the eyewash or shower, they would likely be considered an obstruction if they inhibit immediate use of suitable drenching facilities. ANSI does say, however, a single step up into an enclosure to access equipment would not be considered an obstruction.

Also, if employees had to lift a conveyor or other piece of equipment to get to an eyewash or shower, it would likely be considered an obstruction.

Again, unobstructed means that there is no impediment to get to the unit. ♦



Key to remember: An eyewash and shower should be no farther than a 10 second travel time from the hazard. ANSI says that an average person covers a distance of approximately 55 feet in 10 seconds when walking at a normal pace.

Are you using the most current emergency eyewash and shower standard?

ANSI/ISEA Z358.1-2014 was prepared by the Emergency Eyewash and Shower Group of the ISEA. This current revision updated the 2009 version and includes further clarification to emphasize that fluid flow location and pattern delivery for emergency eyewashes and eye/face washes is the critical aspect in designing and installing these devices, rather than the positioning of nozzles.

Additionally, illustrations were updated to reflect contemporary design configurations that are known to meet the criteria in the standard. The standard provides details about how to select, install, inspect, and maintain eyewashes and showers. OSHA would

expect every employer to follow these safety requirements when eyewashes and showers are required in your workplace. OSHA uses it for enforcement and employers may want to purchase a copy for reference. The standard also goes into detail about how to train workers properly.



In addition to the revised standard, the ISEA's *Emergency Eyewash and Shower Equipment Selection, Installation and Use Guide* is a document that aids employers in the proper selection, use, and maintenance of equipment. ♦

Understanding the limitations of eyewash bottles

OSHA 1910.151(c) standard, *Medical Services and First Aid*, requires that employers provide emergency eyewashes when employees may be exposed to injurious corrosive materials during the course of their work. Employers have a wide range of eyewash types available to choose from on the market, including portable units (i.e., eyewash bottles). While many employers use bottles, OSHA says that they can't be the only eyewash made available to employees, and their use should be limited.

Bottles vs. other eyewashes

The OSHA standard does not provide a great deal of detail on eyewashes for employers. However, where the regulation is silent, OSHA refers employers to the American National Standards Institute (ANSI) standard Z358.1-2009, "Emergency Eyewash and Shower Equipment," regarding installation, operation, and maintenance of emergency eyewashes. This includes capacity and flushing requirements. The ANSI standard states that an eyewash must deliver 0.4 gallons of flushing fluid per minute for at least 15 minutes.

As such, ANSI says that an eyewash bottle does *not* meet these criteria; therefore, it can only be used to support eyewashes that do (i.e., plumbed and self-contained units), but cannot replace them.

Capacity

The reason for this limitation is that eyewash bottles simply cannot provide the required 15 minutes of flushing. Eyewash bottles typically hold less than a gallon of water, which would supply the user with flushing fluid for approximately 1 minute. Even larger self-contained units (those with bladders) that have a capacity of 5 to 10 gallons would only provide maximum use of about 5 minutes.

In other words, eyewash bottles don't provide an adequate amount of flushing fluid and cannot be considered a primary means of protection.

Limitations of use

For this reason, OSHA warns that the use of eyewash bottles should be limited. In a 1986 memorandum to Regional Administrators, the agency states, "In general, squeeze bottles should not be used except where the hazard severity or distance from plumbed eyewash equipment requires personal equipment at work stations for immediate flushing prior to prolonged flushing at a plumbed or self-contained unit."

In other words, employers can provide eyewash bottles in instances where plumbed or self-contained units can't reasonably be provided (e.g., an outside yard) in the immediate work area, but only until they can reach a unit which can provide the amount of flushing fluid necessary to flush the eyes for at least 15 minutes.



OSHA expects the employer to determine the level of the potential risk to employees and provide eyewash (and/or shower) protection accordingly. The severity of the hazard(s) involved is a critical consideration when making this determination. In the past, OSHA has said that 1910.151(c) is meant to cover strong acids and alkalis, and the requirement to provide suitable facilities for quick drenching or flushing depends on the exposure and the strength of the hazardous chemical. Chemicals and materials such as household detergents or cleaners, sawdust, metal filings, etc. would not require emergency eyewash (or shower) under the standard.

OSHA Enforcement

If an employer determines that an eyewash is needed, then it must meet the provisions set forth in the American National Standards Institute (ANSI) standard Z358.1-2014. The agency uses the ANSI standard as an enforcement tool. This is clarified in a November 1, 2002 Letter of Interpretation, which says: "If OSHA inspects a workplace and finds unsuitable facilities for quick drenching or flushing of the eyes and body, a citation under 29 CFR 1910.151(c) would be issued. When determining whether the eyewash or shower facilities are suitable given the circumstances of a particular worksite, OSHA may refer to the most recent consensus standard regarding eyewash or shower equipment..."

Without the ANSI standard, employers would find it difficult to demonstrate to OSHA exactly how their eyewash and shower units were suitable exclusive to the regulatory language under 1910.151(c) since it's limited and vague. ♦



Key to remember: Eyewash bottles don't meet the requirement under 1910.151(c) to provide "suitable" facilities for quick drenching or flushing of the eyes. They cannot be the only eyewash provided in the workplace.

Eyewashes and showers must be inspected and maintained

Fortunately, most eyewashes and showers are not used with frequency. Regardless, ANSI says that they must be routinely inspected and maintained. Each requires something different.

Inspection

Specifically, self-contained units need to be visually inspected each week to determine if the fluid needs to be changed or more added. If more fluid does need to be added, it should be done per the manufacturer's instructions.



Plumbed units need to be tested weekly for a period long enough to verify that they operate properly and ensure that flushing fluid is readily available. Sediment build-up can prevent fluid from being delivered

to the head of the device. Testing also helps remove any microbial contamination that may be present due to stagnant water. A particular type of amoeba is commonly found in eyewashes and can cause severe eye infections when introduced into the eyes during the flushing process.

ANSI says that you should run units for at least three minutes. Still, the duration of the test is going to be dependent on the volume of water contained in the unit itself and in the sections of pipework that don't form part of the constant circulation system – or “dead leg” portions. Water in these sections is stagnant until a flow is activated by opening a valve. You want to flush out any stagnant water that is in the dead leg completely.

For combination units, the eyewash and shower must operate both individually and simultaneously. If it doesn't, then it's considered non-functional and must be repaired or replaced.

Maintenance

When plumbed or self-contained eyewash units aren't properly maintained, contamination of the water supply can develop; dust, chemicals, and atmospheric conditions can cause units to seize up or rust could make the units inoperable.

ANSI says that a more thorough annual inspection should be performed to ensure that units are being maintained per the manufacturer's installation and operating instructions with detailed guidance outlined in the standard. For example, there is a specific spray pattern that must be emitted from eyewashes to ensure proper flushing. These and other details are what need to be checked each year.

Also, employers tend to want to perform preventive maintenance on eyewash units by covering them to prevent some of the issues caused by the nature of the work environment. Covers cannot be used unless they

are specifically designed and installed to the eyewash manufacturers' specifications or don't require a separate motion to remove or open the cover when the eyewash is activated. An alternative cover, like a shower cap, may only be used when it's automatically removed upon activation.

Remember, quick and unfettered access is paramount for immediate flushing. ♦



Key to remember: Self-contained units need to be visually inspected each week to determine if the fluid needs to be changed or more added. Plumbed units need to be tested weekly for a period long enough to verify that they operate properly and ensure that flushing fluid is readily available.



TEST YOURSELF

Exposure determination

When determining if an emergency eyewash and shower are needed in the workplace, besides performing a hazard assessment as described in this newsletter, employers must also consider the exposure to workers. An employer should evaluate the potential for the corrosive material to get into the eyes or on the skin. Consider:

- ❑ **Type of equipment** — For example, piping containing caustic materials that have a spigot or tap from which the contents are withdrawn can be a source of exposure to corrosive materials.
- ❑ **Use** — Consider how employees work with chemicals during handling, transfer, use, or disposal operations. All determinations of exposure should be made without regard to the use of personal protective equipment such as goggles, face shields, gloves, or aprons. Keep in mind that the use of PPE does not change the requirement for an eyewash or shower.
- ❑ **Worksite conditions** — Temperature, fixed or non-fixed locations, the layout of the facility, etc. can play a role in an exposure.
- ❑ **Quantity of exposure** — Could the amount of present chemical result in exposure to substantial portions of the body? If so, then a shower would be necessary to supply a sufficient volume of flushing fluid.

If an employer has corrosive chemicals and employees can be exposed to them, then they must provide an emergency eyewash and shower. ♦

Flushing fluid: Not too hot, not too cold but just right

OSHA does not specify a water temperature for eyewashes or showers, but does address the issue in an April 18, 2002 Letter of Interpretation in which it says, “It is the employer’s responsibility to assess the particular conditions related to the eyewash/shower unit, such as water temperature, to ensure that the eyewash/shower unit provides suitable protection against caustic chemicals/materials to which employees may be exposed.”



OSHA also says that water which is too hot or too cold will prevent the affected person from flushing the eyes for the full 15 minutes recommended in emergencies or on most SDSs.

Temperature

ANSI and some state-OSHA plans say that the flushing fluid used in emergency eyewashes and showers should be “tepid.” This is defined as a temperature range between 60 and 100 degrees Fahrenheit. Temperatures of more than 100 degrees have proven to be harmful to the eyes and can enhance chemical interaction with the skin. Water less than 60 degrees can provide immediate cooling, but prolonged exposure can affect body temperature and delay or prematurely stop first aid treatment.

Mixing valves

Once activated, eyewashes must be used without requiring the use of the operator’s hands so that both hands can be used to hold the eyes open for flushing or the removal of clothing. This requirement would not be met if an employee was expected to fiddle with knobs to manually regulate the fluid flushing temperature of the eyewash or shower. In these cases, a mixing valve in the faucet (for faucet-mounted units) or the corresponding plumbing (for plumbed units) may need to be installed. The ANSI standard does not require a mixing valve per se, but, again, it does say that plumbed eyewashes must be able to deliver tepid flushing fluid.

Freeze protection

Sometimes, emergency eyewash and shower equipment must be made available under varying environmental conditions due to the nature of the work being performed. In some cases, freezing conditions can pose a problem. ANSI says that if there is a possibility of freezing, units must be protected to ensure, again, that tepid flushing fluid is delivered.

For self-contained eyewash units, ANSI says that heated blankets that cover the entire unit may be used to keep the flushing fluid from freezing. For plumbed units,

ANSI says there are several methods of freeze protection available, including:

- ❑ **Electrical heat tracing designs** — Units are wrapped with heat trace cable and insulation and then are jacketed with a protective shell.
- ❑ **Frostproof hydrant designs** — Supply lines are buried below the frost line, where they are resistant to freezing and deliver flushing fluid only when the unit is activated.
- ❑ **Proximity designs** — Outside units are located on a wall adjoining a heated space with the water supply and valves inside. ♦



Key to remember: ANSI and some state-OSHA plans say that the flushing fluid used in emergency eyewashes and showers should be “tepid.” This is defined as a temperature range between 60 and 100 degrees Fahrenheit.



Expert Help: Question of the Month


Question: Does OSHA require an eyewash in a forklift battery charging area?

Answer: OSHA says, based on an Occupational Safety and Health Review Commission ruling, that employers are not required to have an eyewash (and/or shower) station for an area where no maintenance is performed on powered industrial truck batteries; that is, when they are being charged *only*.

It would still be considered a best practice to have an eyewash (and/or shower) station in the charging area. Also, your liability insurance carrier may require you have one there. ♦



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Notes from your Consultant, Greg Daugherty

Over the past two months I've assisted clients with four separate OSHA investigations due to serious incidents. What was interesting

is that they're automatically expanding into an inspection that's outside of the investigation issue. All four times OSHA has asked for the PPE hazard assessments and the energy isolation procedures even though the incidents were in no way connected to PPE or energy isolation. This means that OSHA has at least two new special emphasis programs.

Both PPE hazard assessment and energy isolation programs are basic components of your safety program and are a 1910 General Industry requirement. Every employer uses some type of PPE, even if only safety glasses, and even that basic level requires a PPE hazard assessment documentation. The same goes for energy isolation. Also, don't forget that both require employees to be trained in the hazards and the controls.

Stay safe,
Greg

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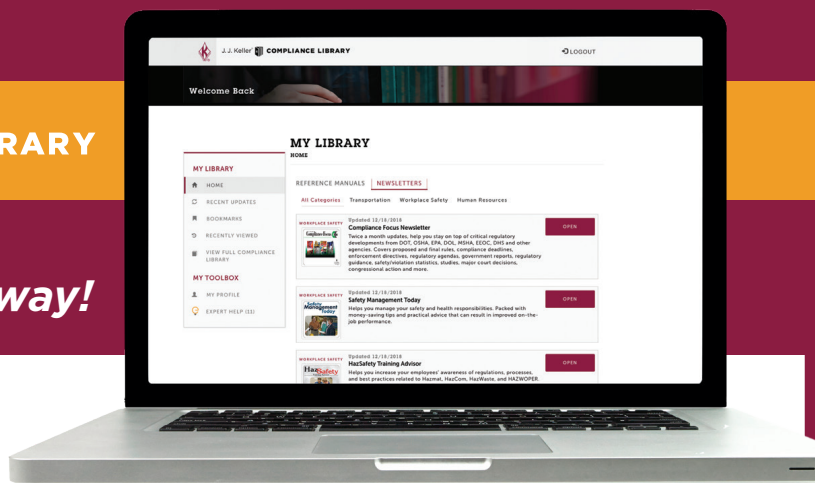
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