

CONN-OSHA QUARTERLY

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Emergency Eyewash Equipment

By *Kate Decker-Wurm, M.S., Occupational Hygienist*

Chemical Eye Injuries in the Workplace

Employees who work with chemicals are at risk for eye injuries. Chemical burns are responsible for approximately 11.5-22.1% of eye injuries and require immediate and effective treatment. [1] Industrial chemicals and cleaning products are common causes of chemical burns to one or both eyes. [2]

Acids (such as acetic acid, sulfuric acid, and nitric acid) have low pHs. When acids contact the eye, they precipitate tissue proteins (Coagulative Necrosis). These precipitates create barriers which can localize the acid to external eye structures (like the cornea) and limit access to internal eye structures (like the lens) impeding injury to deeper tissues. [3,4]

Alkalis (such as ammonia, lye, and lime) have high pHs. Alkalis penetrate to the interior of the eye more readily than acids due to how they react with cell membranes. Alkalis cause dissolution of tissues (Liquefactive Necrosis) which results in injuries to external structures of the eye (like the cornea) as well as internal structures (like the lens) and require longer flushing times to decontaminate. [3,4]

Eye injuries due to chemical exposure range in severity from irritation and burns to loss of vision. The severity of the injury primarily depends upon the characteristics of the chemical itself, the amount of the chemical, how long the chemical is in contact with the eye, and how quickly effective medical treatment is provided. Immediate irrigation is universally recommended to remove the chemical and minimize damage. Eyewashes are considered first-aid measures used in the initial stages of emergency exposures. Delaying treatment, even for a few seconds, increases the severity and the chance of permanent damage. [1,3]

What are the standards?

Accidental chemical exposures can occur even with appropriate combinations of engineering controls, administrative controls, work practice controls, and personal protective equipment (such as chemical resistant goggles and face shields). [5]



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Employers are required to provide eyewash and shower equipment for emergency use by employees as described in 29 CFR 1910.151(c): “Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.” [6] OSHA defines corrosive as a chemical that “causes visible destruction of, or irreversible alterations in living tissue by chemical action at the site of contact.” [7]

Eyewash facilities are also required by the OSHA Standards including, but not limited to, HIV and HBV research laboratories and production facilities (29 CFR 1910.1030(e)(3)(i)) and where there is any possibility that an employee’s eyes may be splashed with solutions containing $\geq 0.1\%$ formaldehyde (29 CFR 1910.1048(i)(3)). They are also found in workplaces with additional products and materials that have the capability of producing adverse effects such as physical or chemical injury and infection. [8, 9, 10]

Are emergency eyewashes required for my workplace?

The determining factor used to evaluate if an eyewash is required is if there is potential for employees to come into contact with corrosive materials (and/or solutions containing $\geq 0.1\%$ formaldehyde, and/or HIV/HBV (research/production settings)) and experience an exposure/injury to the eyes. [11]

Employers should conduct workplace Hazard Assessments, by consulting various professional safety resources and reviewing Safety Data Sheets (SDS), to identify corrosive and injurious materials in the workplace and the required protective measures and equipment. [12]

If the product is corrosive to the eyes, the Health Effects Section of the Safety Data Sheet (SDS) will have a “Corrosion” pictogram and the First Aid Section will indicate a need to flush the eyes for at least 15 minutes. Other instructions may also be included such as directions to lift the lower and upper eyelids during the flushing process and consultation with a physician.



How do I comply with the standard?

The OSHA standard does not set specifications for

emergency eyewash and shower equipment, but OSHA has noted that equipment that complies with the American National Standards Institute (ANSI) Z358.1 consensus standard requirements would usually meet the intent of the OSHA standard. In addition, when evaluating suitable equipment specifications such as the type, location, installation, and maintenance of eyewash and shower equipment OSHA also references other recognized medical, technical, and industrial hygiene resources. [11]

The current ANSI Z358.1-2014 consensus standard establishes universal minimum performance and use requirements for all eyewash and shower equipment that is used to treat the eyes, face, and body of employees exposed to hazardous materials and chemicals. [13]

Key ANSI Z358.1-2014 Specifications

- Emergency eyewash/shower stations must be within 10 seconds (approximately 55 feet), visible, on the same level, and with an unobstructed path. For particularly caustic or corrosive chemicals, emergency eyewash stations should be located immediately adjacent to the working area.
- Emergency eyewash/shower stations must be able to switch from ‘off’ to ‘on’ in one second or less and remain on without the use of the operator’s hands.
- Emergency eyewash/shower stations must provide tepid water in the range of 60°F to 100°F (16°C to 38°C).
- Emergency eyewashes must be able to deliver at least 0.4 US gallons per minute (1.5 liters per minute), of a flushing fluid (such as potable water) for at least 15 minutes.
- Emergency showers must be able to deliver at least 20 US gallons per minute (gpm) (75.7 liters per minute), for at least 15 minutes. Certain products may require flushing times that are longer than 15 minutes as indicated on their SDS.
- All water supply lines must meet minimum flow requirements at 30 PSI. If shut-off valves are installed on the supply line for maintenance purposes, provisions must be in place to prevent unauthorized shut-off.

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- Weekly testing to verify operation, minimize microbial contamination, clear sediment, and ensure the flushing fluid is available at the head of the device. Plumbed flushing equipment "shall be activated weekly...". Portable and self-contained equipment shall "be visually checked to determine if flushing fluid needs to be changed or supplemented." Annual servicing to ensure effective operation. (See article on page 4 for more information on microbial contamination and eyewashes)
- Bottled eye wash and personal wash units are considered supplemental equipment only. They do not replace the need for an eyewash and do not meet the intent of the OSHA standard.

Employee Training

The 29 CFR 1910.1200 Hazard Communication Standard (HCS) requires employers to provide hazardous chemical information and training to employees. Employees must be trained on the hazards associated with the product(s), the locations of eyewash/shower equipment, and the proper procedures for flushing the eyes and skin. [13] Training must be provided at the time of initial assignment, and whenever a new chemical hazard is introduced into the work area. Training can be designed to cover categories of hazards (corrosive, flammable, etc.) or specific chemicals. Chemical-specific information must always be available through labels and safety data sheets. [15, 16]

Where can I get more information on eyewash or shower equipment?

Other design and construction requirements can be obtained in the ANSI/ISEA Z358.1-2014: American National Standard for Emergency Eyewash and Shower Equipment publication which is available on the ANSI Webstore. [14]

Requesting a Consultation

To learn more or request your free consultation from CONN-OSHA:

Call us at 860-263-6900, or visit our [webpage](#)

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Maintaining Eyewash Stations

By Aaron Thompson, Safety Consultant

Eyewash stations are a staple in facilities that use materials that can cause eye injury or eye infection, providing reprieve after accidental exposure.

As described in this issue's front-page article, eyewash facilities are required by several OSHA Standards including, but not limited to, in workplaces where corrosive chemicals are used, in HIV and HBV research laboratories and production facilities and where there is any possibility that an employee's eyes may be splashed with solutions containing 0.1 percent or greater formaldehyde. Eyewashes may also be found in other workplaces that use materials that may cause injury to or infection of the eyes.

Simply having an eyewash station in your workplace isn't enough. Not properly maintaining a station potentially can cause more harm than good and can even create its own emergency.

As noted in [OSHA's Infosheet](#) "Health Effects from Contaminated Water in Eyewash Stations," improperly maintained eyewash stations can become a breeding ground for organisms that exist in stagnant and untreated water. OSHA notes that water found in improperly maintained eyewash stations can become a breeding ground for organisms that exist in stagnant and untreated water. Water found in improperly maintained eyewash stations is more likely to contain organisms such as, but not limited to: *Acanthamoeba* and *Pseudomonas*. These contaminants thrive in stagnant or untreated water and are known to cause eye infections:



Eyewash with protection covers
Source: OSHA

- *Acanthamoeba* is a microscopic single cell organism (amoeba) that may cause eye infections. On rare occasions, exposure to *Acanthamoeba* results in harmful eye infections known as *Acanthamoeba* keratitis. Workers may also experience eye redness, pain, tearing, blurred vision, light sensitivity, and eye inflammation several days after the use of a contaminated eyewash station. Diagnosing *Acanthamoeba* keratitis is difficult because more common eye infections have similar symptoms.
- *Pseudomonas* infections are typically caused by a common bacteria species. *Pseudomonas aeruginosa* may cause eye infections. One symptom specific to *Pseudomonas aeruginosa* infection is green-blue pus in or around the infected area. This bacterium has developed resistance to many antibiotics, which may make it harder to treat.

To prevent contamination, it is extremely important that facilities always follow the manufacturers' instructions for maintaining eyewash stations. The instructions detail when to use specific plumbed systems to avoid microbial contamination and generally reference the American National Standards Institute (ANSI) standard Z358.1-2014. Likewise, self-contained stations also have directions for flushing the system and recommendations on what solutions to use to flush the eyes.

Employers should also provide appropriate training to employees on the proper use and maintenance intervals of eyewash stations at their facility.

How to Subscribe

Contact robert.hunt@ct.gov and in the subject line type "Subscribe" and then provide your e-mail address in the body of the message.

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DATE

Training Schedule



Virtual Bloodborne Pathogens <i>11/9/22</i>	This workshop introduces participants to the requirements of 29 CFR 1910.1030 Bloodborne Pathogens. Emphasizes developing the knowledge and skills necessary to do program development, administration, and training as required by the rule.
Virtual Hazard Communication <i>12/14/22</i>	The Hazard Communication Standard, 29 CFR 1910.1200, provides workers exposed to hazardous chemicals with the right-to-know the identities and hazards of those materials. as well as appropriate protective measures. This session will provide an overview of the standard and help attendees develop an effective Hazard Communication Program.
Virtual OSHA 300 Recordkeeping - What Does and Does Not Need to be Recorded <i>1/24/23</i>	The purpose of this workshop is to introduce the requirements and procedures related to OSHA Injury & Illness Recordkeeping, including the electronic reporting of injuries and illnesses requirements. The class will help develop skills to accurately report occupational injuries and illnesses. Resources and reference materials will be provided. If you are responsible for completing the documents required by this rule (OSHA 300, OSHA 300A and OSHA 301), or if you supervise the person that completes the forms, or if you are a safety committee member, this class is a must!
Virtual Intro to OSHA <i>2/8/23</i>	<p>Who is OSHA? Why are they here? What will they ask for? What gives them the right to...! These are questions that are often asked and during this session these questions will be answered. We will also address the topic of “Hazard Recognition” and what that should mean to you and the people that are close to your hearts which is the real reason to “work safe”.</p> <p>During this session the following disciplines will be briefly discussed:</p> <ul style="list-style-type: none">• Who is OSHA?• Who is CONN-OSHA?• What happens in an OSHA inspection?• The 10 most frequent citations issued last year and what did they cost?• Hazard Recognition and what that means to me.
Breakfast Roundtable <i>3rd Tuesday of the Month</i>	These meetings cover subjects ranging from evacuation plans and fire extinguishers to air quality and ergonomics. The intent of these free 90-minute workshops is to discuss safety and health issues in a supportive and informal environment. The roundtable meetings are held from 8:15 am to 9:45 on the third Tuesday of the month.

[Visit this link for more info and to sign up.](#)



Farewell to Ken Tucker

After 37 years of state service, Kenneth Tucker III is retiring from CONN-OSHA. Ken has devoted his entire career to protecting the working people of Connecticut from occupational safety and health hazards.

Ken was hired as a Health Compliance Officer February 1, 1986. He was promoted to Occupational Health & Safety Manager in 2004 and was appointed CONN-OSHA Director in January 2012. He served as a steward for the A&R Union from 1989-2001 and served on the Occupational Safety and Health State Plan Association (OSHSPA) Board of Directors for three terms from 2016-2021.

Ken has made innumerable contributions to the CONN-OSHA program. During his tenure as Director, he worked on making CONN-OSHA more visible by enhancing our partnerships and alliances with as many stakeholder organizations as possible (both management and union related). In addition, he enhanced CONN-OSHA's role during the state's emergency response activities. For example: After major storm events CONN-OSHA provided outreach and training to cleanup crews; during the

Avian Flu outbreak CONN-OSHA staff offered multiple state agencies train-the-trainer fit testing programs and during the COVID pandemic Ken and other CONN-OSHA staff served on the Re-open Connecticut Rules Committee and provided subject matter expertise on respiratory protection through ESF7. Closer to home, when the Division experienced significant turnover, Ken made sure the vacant positions were filled and oversaw the hiring two-thirds of the existing staff.

When asked what he valued/enjoyed most about working for CONN-OSHA Ken replied: "Since I have been working at CONN-OSHA, there has never been a time when I didn't want to come to work. The CONN-OSHA staff have been my extended family for over 37 years and being able to work with such a dedicated and professional team is what has kept me motivated and continues to challenge me to make a difference every day."

During his retirement Ken plans to spend more time with family and he hopes to travel more. The staff at CONN-OSHA wish Ken well. He will be missed.



Welcome Sawyer Gunnell

Sawyer joins us as a Connecticut Careers Trainee (Occupational Safety and Health Officer target class). Sawyer has a BS in Safety and Health from Keene State College. He has five years of experience working in the field. Most recently the focus of his work was on hazardous material assessment and abatement.

Hazard Corner: There have been multiple incidents involving hospitalizations following eye or skin exposure to corrosive chemicals.

Case 1

A quality control technician was in the lab changing out the sodium hydroxide solution from a machine called the can shaker. He poured the solution from the glass container attached to the can shaker into a cut-off 1-liter plastic water bottle, with the intent of disposing of the chemical in the sink. The container slipped from his hand to the floor and splashed sodium hydroxide into his left eye and severely damaged it. He quickly turned to the sink behind him, turned on the faucet, and tried to activate the eyewash but could not, so he used his hand to splash water on his eyes. A coworker, who was in the lab doing paperwork with her back turned to the employee, ran and activated the eyewash for him. He flushed his eyes for between 5 to 10 minutes. The coworker contacted the plant manager, and the employee was taken to the hospital.

Case 2

Workers at a wastewater treatment facility are required to add caustic soda (pH of 14 per SDS) to the tanks for pH control. An employee was moving a container of caustic soda and had soda liquid splashed into his eye because the lid was not properly on the container. There was no eye wash in the immediate vicinity, adjacent to the operation, with unimpeded access. The employee suffered chemical burns and was hospitalized.

Case 3

An accident occurred at a refinery. The day before the accident, the unit operator noticed that a vessel was draining very slowly. The unit operator notified Employee #1 who was working the night shift from 6 p.m. to 6 a.m., of the extended drain times. While draining the vessel, Employee #1 heard a rumbling sound coming from the tank, and then liquid shot out of the drain, spraying him. He was wearing safety glasses but not a face shield or splash goggles. The liquid that sprayed Employee # 1 was a high pH caustic liquid. Employee # 1 was temporarily blinded and had to be assisted to the safety shower and eyewash facility by his coworkers. Employee # 1 was admitted to the hospital, treated for six days in a hyperbaric chamber, and received saline eye flushes. For the first three days he could not see, and the next three he had very blurry vision. An analysis of the accident indicated that it may have been prevented if the draining operation had been converted to a completely closed system. Injury to the employee could have been prevented if he had been wearing appropriate ppe, such as a face shield or chemical splash goggles.

Fatality & Casualty Reporting

State & Town:

- Report to CONN-OSHA
- (860) 263-6946
- (866) 241-4060 *Toll Free*

Private Employers:

- Report to Federal OSHA
- (800) 321-OSHA (6742)



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