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SELECTING EMERGENCY EYEWASH STATIONS

Five Main Elements of an Emergency Eyewash Program

For 70 years, emergency eyewash stations and showers have been an injured worker's first defense against long-term eye damage and potential blindness. Like other types of safety equipment, emergency eyewash stations have become safer and easier to use. Units have progressed from primitive fountain-style, plumbed stations that flush the eye with cold tap water to portable, self-contained, gravity-fed units that use a buffered saline solution which more closely replicates human tears. As a result, users are less likely to suffer permanent damage and often recover more quickly.

Implementing an Eyewash Program

With more than 1,000 workplace eye injuries occurring per day, employers need to ensure that emergency eyewash stations are inspected and maintained regularly to guarantee optimum performance. In order for emergency treatment to be successful, review the following points before purchasing or installing a unit.

Identify Potential Hazards

Everyone has the potential to be injured, regardless of precautionary steps. Thirteen percent of workers are struck by something while wearing safety eyewear. Workers can also sustain eye injuries while performing routine procedures with toxic materials in powder, mist, vapor, or liquid form.

In fact, 20% of all eye injuries are caused by chemical contact and another 6% result from ultraviolet burns. Harsh chemicals, like lye, bleach, and acids, as well as exposure to a welder's arc or blast, can burn eye tissue and cause permanent damage.

Overall, nearly 70% of eye injuries are the result of a foreign body.

Compliance with Standards

The American National Standards Institute (ANSI) mandates that all eyewash stations require no more than 10 seconds to reach, a standard that requires critical placement of the units. ANSI and the National Society to Prevent Blindness recommend that emergency eyewash stations be readily available, in accessible locations, and free of obstructions that inhibit immediate use of the equipment.

According to ANSI, all eyewash stations must be capable of producing a stream of flushing liquid not less than 0.4 gallons per minute (gpm) for at least 15 minutes. However, the immediacy of irrigation is the critical component. Continuous and timely irrigation for the full 15 minutes are the principal factors in providing first aid treatment. While both plumbed and self-contained emergency eyewash stations meet these needs, the type of flushing fluid used is critical to comfort.

Although regulating agencies do not include comfort in standards guidelines, ANSI's regulations previously stated that cold tap water was acceptable for use in plumbed and self-contained stations. ANSI now mandates that those stations using water should use tepid water instead to improve user comfort for the full 15-minute flush cycle.

In addition, the standard recommends that the self-contained eyewash stations use a preserved, buffered saline solution rather than tepid tap water. The saline solution offers more comfort because it attempts to replicate tears, which are a naturally-buffered salt solution, according to Dr. Henry Edelhauser, Professor of Ophthalmology and Director Ophthalmic Research, Emory University School of Medicine.

"Tap water is not buffered, nor does it contain any of the necessary salts," he said. "Tap water does not have the composition of human tears."

Flushing with Water vs. Buffered Solutions

The eye's sensitive composition requires that flushing fluids follow certain guidelines. At less than 1 mm thick, the eye's cornea is an extremely delicate, very thin area with no blood vessels. The outer layer of the cornea, the epithelium, provides an effective barrier against bacterial invasion, but when that barrier is broken, minor injuries expose the cornea to painful irritation.

When a foreign substance enters a worker's eye, the recommended first aid is to quickly locate an emergency eyewash station and thoroughly flush both eyes for 15 minutes to dislodge the object. While some self-contained and all plumbed eyewash stations use tap water as the primary flushing fluid, most self-contained stations—portable or wall-mounted—use a buffered saline solution that is either stored in sealed, replaceable fluid cartridges or a concentrated formula mixed with potable water.

Plumbed eyewash stations, which are permanently connected to a facility's water supply, only deliver potable (tap) water, which can become contaminated with microorganisms and bacteria from the walls of a plumbed station's water pipes or inside self-contained stationary units where microorganisms can be introduced during mixing, filling, or inspection.

While potable water is widely available, it is not the preferred solution for emergency flushing. Many experts, including the Food and Drug Administration (FDA), believe that the ideal flushing solution for emergency situations should be clean, free of contamination, preserved, isotonic, and pH-balanced to reduce the likelihood of causing additional damage and discomfort to the eyes. According to FDA document 21 CFR Parts 34a and 36a, "because an eyewash is intended to be used in the eyes, it should be physiologically compatible with tears."

In contrast to tap water, saline solutions contain an antimicrobial preservative proven to reduce the likelihood of causing additional damage to an injured eye.

Portable, self-contained emergency eyewash stations often use a buffered, isotonic, saline solution, which combines select preservative, including bactericide, fungicide, and algacide additives, to inhibit bacterial

growth. These gravity-fed stations dispense a soft ribbon of purified, contaminant-free saline solution that is physiologically balanced to match human tears.

According to experts, saline solutions offer users greater comfort than any other flushing fluid and are proven to cause less damage to the eye when compared with tap water.

“We found that flushing with tap water damaged three or more layers of the protective corneal epithelial,” said Dr. Roger Beuerman, Professor of Ophthalmology at the Louisiana State University (LSU) Health Sciences Center, who led a study that compared the cells on the outer surface of a normal eye after flushing with a preserved pH-balanced saline solution.

“The cells flushed with a buffered saline solution caused less damage to the epithelial cells of the eye, resulting in a quicker healing and recovery time,” Beuerman said.

Inspection and Maintenance

In the most recent study available, more than one-third of the emergency eyewash stations inspected at 200 manufacturing facilities were inoperable or would not function appropriately. The leading cause was improper maintenance, including incorrect plumbing supply lines and connections, low fluid levels in self-contained stations, and dirt and debris in the bowl or basin.

If bacteria or mold is present in any emergency eyewash station, an injured eye could potentially be flushed with contaminated water. According to ANSI, plumbed eyewash units need to be activated weekly to verify proper operation and flush away any build-up that formed as a result of stagnant water. Self-contained stations using a mixed concentrated solution, which often expires after six months, are at risk for bacteria, and must be cleaned and replaced in accordance with the manufacturer’s instructions, regardless of use.

Stations with factory-sealed fluid cartridges require only a weekly visual inspection or an after-use cleaning. Fluid cartridges quickly and easily install in five minutes, and have a 24-month shelf life if the unit is not activated. This two-year shelf life is determined by the date of manufacture, and it is more than four times longer than any other primary, self-contained eyewash station. Portable stations that use replaceable fluid cartridges eliminated the need for access to clean water in emergencies, which is often an issue. In many locations, especially foreign countries, it is nearly impossible to find a dedicated water source free of algae, bacteria, or iron build-up.

Fluid Disposal

During and after use, safety personnel are often concerned with how to discard the used flushing fluid. Portable self-contained stations that use fluid cartridges have reservoirs to retain all wasteflushing fluid, with a drain valve that allows for easy disposal after treatment, eliminating the need for additional equipment, plus the potential fall hazards caused by a slippery floor.

In contrast, other self-contained stations have a valve or opening that dispenses flushing fluid immediately into a separate wasted disposal container or, if a container is not available, on the floor. In plumbed stations, flushing fluid washes down the drain as the water source would normally drain.

Conclusion

With further research and modern designs, emergency eyewash stations and flushing fluids continue to exceed safety standards and deliver maximum user comfort to ultimately save worker’s eyesight.

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