Eyewash and shower requirements for forklift Battery charging

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Introduction

Questions have been raised about the rationale used to determine when eyewash fountains and showers must be provided for the charging of forklift batteries. The Regulations for Industrial Establishments provide very little guidance since there are no specific eyewash and shower requirements exclusive to battery charging.

However, there are two sections in the Regulations for Industrial Establishments that set general requirements, which are applicable to all industrial establishments.

Section 124 sets out the requirements for eyewash fountains as follows:

> *Where a worker is exposed to a potential hazard of injury to the eye due to contact with a biological or chemical agent, an eyewash fountain shall be provided.*

Section 125 sets out the requirements for a deluge shower as follows:

> *Where a worker is exposed to a potential hazard of injury to the skin due to contact with a substance, a quick-acting deluge shower shall be provided.*

Due to the general nature of these requirements, guidance is needed both for IHSP inspectors and the workplace parties to provide clear rationale for determining when these facilities are required. The second issue is the establishment of performance criteria that will ensure the equipment will provide adequate protection.

The purpose of this guidance material is to clearly set out the rationale for deciding when eyewash and/or showers are required and an indication of what performance criteria are necessary, to be in compliance with the regulatory requirements.

Question #1: If workers are provided with and instructed to wear personal protective equipment (such as goggles, apron, and gloves) does this negate the need to provide facilities to flush acid from the eyes and skin?

Answer: The wearing of proper personal protective equipment (PPE) does not negate the requirement to provide proper facilities to flush acid from the eyes and skin. While the wearing of PPE should prevent acid from contacting the eyes and skin, the flushing facilities are necessary in certain situations to provide protection in the event PPE fails to provide adequate protection (e.g. improper fitting, defects in the equipment or not all parts of the skin covered).

Question #2: Is there any reference or standard that sets out detailed and specifications for emergency eyewash and shower requirements?

Answer: ANSI Z358.1-2004 entitled Emergency Eyewash and Shower Equipment (revision of 1990 standard) is recognized as the only consensus standard dealing with this topic. There is no equivalent CSA (Canadian Standard Association) Standard.

The ANSI Standard establishes minimum performance and use requirements for eyewash and shower equipment for emergency treatment of the eyes or body of a person who has been exposed to injurious materials.

Question #3: Is an eyewash station required when forklift batteries are charged?

Answer: The decision on whether or not an eyewash station is required is based on an Evaluation of the requirement of the Section 124 of the Regulations for Industrial Establishments. If it can be determined that the potential of eye contact with electrolyte (also known as battery acid or sulphuric acid) is small, and then an eyewash is not required.

A maintenance free battery is a sealed unit with the exception of a valve that opens to atmosphere when the internal pressure of the cell exceeds atmospheric pressure by a prescribed amount. Since a maintenance-free battery is essentially sealed, it is not possible to add water or electrolyte to the cells and thus the potential for eye contact with electrolyte is essentially non-existent. As a result, eyewash stations are not required if only maintenance free batteries are charged.

Lead-acid batteries, commonly known as non-sealed batteries, require regular watering, and in some case the addition of electrolyte. The potential for acid contacting the eyes is considered to be very high when lead-acid batteries are charged.

Prior to charging, all cells should be checked to ensure that liquid is covering the plates. If the plates are not covered, water is added. During charging the liquid level rises and in some cases can spill onto the top of the battery. This electrolyte requires cleaning up and presents potential for acid contact with the hands, which could be transferred to the eyes if they are rubbed. On a regular basis the specific gravity of the electrolyte must be checked using a hydrometer. During this process electrolyte (acid) is drawn off and returned to battery cell, which presents a potential for acid contacting the eye. In some cases when a cell is not coming up to full charge, electrolyte may be added directly to the cell. This presents another potential for the electrolyte splashing into workers eyes.

As a general rule all battery charging of lead-acid (non-sealed) batteries **must have** an eyewash station.

Question #4: What are the minimum requirements of an eyewash station?

Answer: The minimum requirements as suggested in ANSI Z358.1-2004 are as follows:

I. The unit is to be positioned with the nozzles not less than 33 inches and not greater than 45 inches from the floor and 6 inches from the nearest obstruction (section 7.4.1).

II. Both eyes are to be washed simultaneously at a velocity low enough to be non-injurious to the user (section 7.4.3).

III. The valve is to be designed in such a manner that the flow of flushing fluid remains on without requiring the use of the operator's hands. The valve is to remain activated until intentionally shut off (section 7.2).

IV. The unit must be capable of delivering flushing fluid to the eyes not less than 1.5 litres per minute (0.4 gpm) for 15 minutes (Section 5.1.5).

Question #5: Must the eyewash station be a plumbed unit?

Answer: No, it is not essential that the eyewash station be a plumbed unit. Two other devices, which are also acceptable, include:

- Non-pressurized self-contained units
- Pressurized self-contained units

These units are only acceptable if they meet the requirements for eyewash stations as suggested

in ANSI Z358.1-2004 (as specified in answer above).

Question #6: Since there are two acceptable non-plumbed eyewash unit' why would anyone install a plumbed unit?

Answer: There are a number of advantages to installing a plumbed unit. Assuming that a water line is in the vicinity of the charging area, a plumbed unit will cost about the same as a non-pressurized unit and much less than a pressurized unit. However, if the water line is not present there is no cost saving.

One of the major disadvantages of **some** non-pressurized self-contained units is the fact a biocide must be added to the water to prevent the growth of bacteria. In addition, on a regular basis (usually from 3 to 6 months as recommended by the manufacturer) the flushing solution must be drained and fresh water and biocide added. If this is not done as prescribed a worker could be flushing his eyes with contaminated water, which could actually damage the eyes. Unless a record is available (ideally next to the unit) to document that fresh biocide is added on a regular basis it is likely that the flushing solution is contaminated.

FYI Update: The PURE FLOW 1000 is the only self-contained eye wash unit that does not require the labour of cleaning, disinfecting and the adding of a biocide. Instead, this unit accept 2 sterile cartridges of Eyesaline eye flushing solution with a shelf life of up to 24 months. It only takes minutes to replace the solution cartridges in the event of activation of the unit or expiration of the solution, which is clearly marked for the user. To learn more about this unit click here.

With the pressurized units it is critical that the pressure be checked on a regular basis and the biocide replaced as recommended by the manufacturer.

> When the self-contained units are used to flush the eyes it is critical that the units be cleaned, disinfected and immediately refilled with fresh water and biocide in order to ensure that they are ready for immediate use.
>
> In contrast to the need to add fresh biocide on regular basis the plumbed eyewash should be activated weekly to verify proper operation.

Question #7: Is a hand-held drench hose (which complies with the ANSI requirements) acceptable as a replacement for an eyewash or shower?

Answer: A hand-held drench hose is not acceptable even though it may meet the flow requirements of an eye wash station as set out in the ANSI Standard. This position is supported by section 8.1 of the ANSI Standard, which states:

> Hand-held drench hoses provide support for emergency shower and eyewash units but shall not replace them.

Question #8: What is the justification or rationale for not allowing a hand-held drench hose to replace an eye wash station?

Answer: When a hand-held drench hose is merely connected up to the tap, it doesn't meet all the requirements of an eyewash station set out in the ANSI standard. While the hose will likely meet the flow requirements, it will not allow the worker to hold both his eyes open and have them simultaneously flushed. The normal procedure when using a drench hose is to hold one eye open and flush it, and then do the other eye.

Question #9: Can the hand-held drench hose be modified to replace an eyewash fountain?

Answer: Yes, a hand-held drench hose can be modified to be a replacement for an eyewash fountain. The hose would have to be modified to meet the criteria for an eyewash fountain as specified in the ANSI Standard. The main features would include:

I. The unit is to be positioned with the nozzles not less than 33 inches and not greater than 45 inches from the floor and the 6 inches from the nearest obstruction (section 7.4.1).

II. Both eyes are to be washed simultaneously at a velocity low enough to be non-injurious to the user (section 7.4.3).

III. The valve is to be designed in such a manner that the flow of flushing fluid remains on without requiring the use of the operator's hands. The valve is to remain activated until intentionally shut off (section 7.2).

IV. The unit must be capable of delivering flushing fluid to the eyes not less than 1.5 litres per minute (0.4 gpm) for 15 minutes (section 5.1.5).

FYI Update: ANSI Standard Z358.1-2004 states that drench hose units my supplement, but may not be used in place of, dedicated eye wash units. Talott First Aid & Safety offers a series of units that meet the provisions for *both* an eye wash *and* a drench hose. These dual-purpose units can be used to combine an eye wash and a drench hose into a single versatile, economic unit.

To use the unit as a fixed eye wash, simply leave the unit in the holder. The dual spray heads will deliver water to both eyes simultaneously. To function as a drench hose, remove the unit from the holder and rinse any part of the eyes, face, or body.

These units are particularly useful in areas such as laboratories where workers are handling relatively small quantities of injurious materials. However, should a spill occur, it might affect any part of the worker's eyes, face, or body. Eye wash/drench hose units offer a degree of versatility not found with other types of emergency equipment.

Question #10: What personal protective equipment is required when batteries are handled or serviced?

Answer: All workers involved in handling or servicing batteries must wear the following personal protective equipment:

- Chemical goggles or full face shield
    - Note: safety glasses, even with side shield are not effective in preventing electrolyte splashes from entering the eyes.
- Acid proof gloves (rubber or neoprene)
- Acid resistant apron

Question #11: When is a shower required at a forklift charging area?

Answer: In workplaces where batteries are removed by a hoist and transported to the charging unit, a shower is required. When a hoist transports these batteries there is increased potential for acid spilling out and causing skin contact. There is also potential for the battery to drop due to hoist or rigging failure, which could result in significant skin contact.

Question #12: What are the requirements / specifications for an emergency shower?

Answer: The requirements are set out in ANSI Z358.1-2004. The two basic requirements are:

- The showerhead is to be 84 inches from the surface on which the user stands.
- The unit shall be capable of delivering 20 gpm for 15 minutes.

Please Note: With all emergency safety plumbed-in equipment, please ensure the appropriate Safety Tempered Blending Water Unit is incorporated as per ANSI Z358.1-2004 requirements.