OREGON OCCUPATIONAL SAFETY AND HEALTH DIVISION
DEPARTMENT OF CONSUMER AND BUSINESS SERVICES

PROGRAM DIRECTIVE

Program Directive: A-63
Issued: September 10, 1979
Revised: January 24, 2011

SUBJECT: Eyewash and Safety Showers

AFFECTED STANDARDS/ DIRECTIVES:

Division 2/K Medical and First Aid, OAR 437-002-0161(5) Medical Services and First Aid

Division 4/K Medical/First Aid, OAR 437-004-1305(5) Medical Services and First Aid

Division 2/I Personal Protective Equipment, 1910.132(a) General Requirements, and 1910.133(a)(1), (2) Eye and Face Protection

Division 2/H Hazardous Materials, 1910.101(b)

Division 2/R Special Industries, OAR 437-002-0312(9)(e)(B) Pulp, Paper and Paperboard Mills

PURPOSE: This directive provides guidelines for determining when an eyewash and/or safety shower is required and for assessing the adequacy of such facilities.

BACKGROUND: Since this program directive was first issued, questions have been raised by compliance officers, employees, and employers regarding appropriate enforcement of rules pertaining to eyewash and shower facilities. These questions have come up frequently: (i) the requirements for eyewash and/or deluge showers at nonfixed work sites and for specific agents such as chlorine, anhydrous ammonia and pesticides; and (ii) the type of eyewash and safety shower facilities acceptable for these circumstances.

Since an eyewash and/or shower is first aid rather than a preventative measure, the approach used in this revised program directive is to consider the hazard(s) of the chemical and the immediate and appropriate first aid measures to be used in the event of an emergency. This directive is a guideline to assist in evaluating each situation for the approach that will best protect the employee.

ACTION:

I. Hazard Assessment

When chemicals can contact the eye or body and cause injury, immediate action is necessary to rinse affected areas. An eyewash and/or shower are the primary equipment for such action. Since there are different kinds of chemicals that can cause adverse health effects, an understanding of the potential hazards forms a reasoned basis for planning and responding to potential contact with chemicals. Factors to be evaluated include, but are not limited to:

- Properties of the chemical, such as its physical state, concentration, pH, temperature, and how the chemical may damage the eye and skin;
- Frequency, duration, and quantity of chemicals in use;
- How employees will work with chemicals during handling, transfer, use or disposal operations;
- Appropriate training based on hazard communication, material safety data sheets, and the measures employees can take to protect themselves;
- Personal protective equipment requirements;
- Work-site conditions such as indoor or outdoor, protection from freezing conditions, fixed or nonfixed locations, and facility layout;
- Availability of eyewash and body flush equipment and water sources.

Corrosive chemicals such as strong acids and alkalis are especially damaging to the eyes and skin. In general, acids with pH less than 2.5 and alkalis with pH greater than 11.0 require immediate flushing to prevent bodily damage. With respect to the eyes, alkalis are more injurious than acids because they soak into tissue as long as they remain in contact with the eye. Vision impairment, scarring of the cornea and glaucoma may result.

With regards to hydrofluoric acid (HF), there is no known concentration that is considered "safe." If there is potential for exposure to HF at any concentration, immediate flushing is absolutely critical. Refer to Program Directive A-204 for guidance on HF.

II. General Requirements

The Medical and First Aid rules noted above allow for the use of either plumbed or self-contained eyewash and shower equipment.

Self-contained units are effective in locations where a plumbed water source is not readily available. Both types are effective to the extent they are tested and maintained, meet minimum flow requirements for at least 15-minutes, and allow for hands-free operation of the valves. Manufacturer's recommendations are a key source of information for determining the adequacy of selected units, consistent with the anticipated chemical hazard.

A. Eyewashes

Eyewash units must be provided in fixed work areas or stations when an evaluation of the factors listed above and any additional information indicates that an employee may reasonably be exposed to a substance which can cause corrosion or permanent tissue damage to the eyes.

B. Safety Showers

A safety shower is required at fixed work areas or stations where substantial areas of the body may be exposed to large quantities of materials which are either highly corrosive or highly toxic by skin absorption.

C. Hand-held Drench Hoses

These are single-headed emergency washing devices connected to flexible hoses and used to irrigate and flush the face or other parts of the body. A drench hose may be used to supplement emergency washing facilities. It cannot be used as the sole means of protection or as a substitute for plumbed or self-contained equipment unless it meets the same performance requirements as an emergency eyewash or shower unit.

D. Solutions & Squeeze Bottles

Chemical formulations or isotonic solutions used as substitutes for water must be an appropriate application for the hazard; properly tested and maintained; and replaced prior to their expiration date. Personal eyewash equipment, such as quart or similar size squeeze bottles, may be used to supplement emergency washing facilities. They cannot be used as the sole means of protection or as a substitute for plumbed or self-contained equipment.

E. Faucet-mounted eyewashes

These are devices that fit directly onto existing water faucets. They must meet the same design and operational requirements as dedicated eyewash units. Devices that require one motion to begin water flow to the faucet and another separate motion to activate the eyewash are not acceptable except in situations where the water in the faucet is already flowing before the eyewash needs to be activated.

III. Location of Eyewash and/or Shower

The equipment needs to be immediately available to the work location where the hazardous materials are used.

A. Generally, the distance from the worker's location to the eyewash and safety showers should not exceed 10 seconds walking distance. Immediate eye irrigation within 10 seconds is the determinant factor.

B. The eyewash and safety shower facilities should not be located so that an employee must pass through a doorway or weave around or through machinery or similar obstacles. If other employees are always in the same area to assist an injured employee and they have been instructed in emergency procedures for eye injuries, then this requirement may be waived.

C. For substances which are a gas or highly volatile (i.e., anhydrous ammonia), consideration must be given to locating the eyewash and/or shower outside the immediate source of exposure.

IV. Design Specifications for Eyewashes and Showers

A. Valve Operations: The eyewash and safety shower facilities must have stay-open valves so that an individual can use both hands to hold the eyes open or to remove clothing.

B. Temperature: The rules do not provide for a specific water temperature, but ideally the temperature should be between 60° and 95° F. Water temperatures should not exceed that recommended by a medical advisor where there is a possibility that an adverse chemical reaction may be accelerated by elevated water temperature.

Temperatures in excess of 100° F have proven to be harmful to the eyes and can enhance chemical interaction with the skin. Cold water can provide immediate cooling but prolonged exposure can affect body temperature and result in premature cessation of first aid treatment.

Eyewash and safety showers must be protected from freezing during cold weather.

C. Water Pressure and Volume: The rules do not specify pressure levels. However, the flow and pressure must provide the needed treatment without risking injury to the employee. Water pressure must provide a water flow of at least 0.4 gallons per minute for 15 minutes. The safety shower (plumbed and self-contained) should provide a flow rate of at least 20 gallons per minute for a minimum of 15 minutes under all operating conditions.

D. Water Quality: Use potable water for eyewash and shower facilities. When these are not properly maintained, contamination of the water supply can develop in water reservoirs of both plumbed and self-contained eyewash units. An amoeba (Acanthamoeba) may grow and proliferate in these systems. When the contaminated units are used, the victim may become infected by the amoeba. This may result in damage or loss of the victim's eyes.

Alternatives to potable water, preserved water, or buffered isotonic saline solutions are allowed if the fluid itself is appropriate for the type of decontamination treatment.

E. Testing: All eyewash and shower facilities must be adequately maintained and should be activated weekly to flush the supply line and verify proper operation. Self-contained units should be maintained in accordance with the manufacturer's instructions. Particular attention must be given to changing the flushing fluid so that a safe flushing fluid is available when needed.

F. Covers: In dirty/dusty environments, covers cannot be used unless they are specifically designed and installed to the eyewash manufacturers' specifications, or do not require a separate motion to remove or open the cover when the eyewash is activated. An alternative cover, such as a shower cap, may only be used when it is automatically removed upon eyewash activation.

V. Discussion of Acceptable Eyewash and Safety Shower Facilities

A. General

1. Fixed Work-Site

a. Eyewashes

Plumbed or self-contained eyewash facilities may be used. If a self-contained facility is used, it must remain within the immediate vicinity of the hazardous operation. These units must provide a 15-minute supply of clean water at a flow rate which allows the eyes to be completely flushed.

Water hoses, sinks, or showers are not acceptable when an eyewash facility is required.

b. Showers

An acceptable safety shower must provide a quantity of water sufficient to permit continuous drenching of the entire body for a 15-minute period. The recommended flow rate is 20 gallons per minute.

2. Nonfixed Work Site

Self-contained units are appropriate for nonfixed sites. Adequate performance is assured and maintained when the hazard has been assessed and manufacturer's recommendations are met.

B. Specific Cases

1. Electric Storage Battery Charging

The following applies to electric storage battery charging operations:

a. In areas where the exposure to electrolyte is minimal (i.e., auto garages, service stations, and certain industrial and construction sites), a readily available water hose that provides copious amounts of low velocity potable water is considered minimum employee protection when proper personal protective equipment is used.

b. At construction sites and in commercial and manufacturing facilities where powered industrial trucks are parked for overnight storage and routine battery recharging only, there is no need for emergency eyewash and safety shower facilities unless potential exposure to electrolyte is substantiated.

2. Chlorine

Eye irritation from chlorine occurs at 3-6 parts per million (ppm). At this level the ceiling limit of 1 ppm for chlorine has been exceeded and the employee must wear a full-facepiece respirator. Therefore, an eyewash and shower is not usually required for exposures to gaseous chlorine. Where the potential for exposure to liquid chlorine exists, an eyewash and shower must be provided. Liquid chlorine is defined as elemental chlorine that has been liquified and does not refer to aqueous solutions containing chlorideions.

The emergency medical plan must designate a water supply to be used for flushing the skin and eyes after the employee has been evacuated from a chlorine contaminated area.

3. Anhydrous Ammonia

a. Fixed Locations

Anhydrous ammonia can be severely corrosive to the eyes and skin. Therefore, fixed work sites where anhydrous ammonia is used and plumbing is available or feasible must have emergency eyewash and deluge showers. An additional eyewash and/or shower facility is recommended at locations other than the hazardous work locations when under reasonably foreseeable circumstances, the primary eyewash and safety shower facility would be unusable.

b. Nonfixed Locations, Agricultural Operations

Vehicles transporting anhydrous ammonia in bulk are required to carry a container of at least five gallons of water. In certain circumstances, five gallons of water may not be adequate in an emergency. For example, at rural sites where anhydrous ammonia is transferred from bulk containers to small field containers, other sources of water should be considered, including "dip facilities" that allow the entire body to be immersed.

4. Pesticides

a. Agricultural operations

For rules governing eyewashes and/or shower facilities for those who handle or work around pesticides or other agricultural chemicals, see Division 4/K, OAR 437-004-1305(5). An emergency eyewash, shower, or both is required when employees handle pesticide products labeled *Danger or Danger/Poison* and with a first-aid section on the label that requires rinsing for 15-20 minutes.

[Note: OAR 437-004-1305(5) does not apply to eye flushing supplies required for early entry workers covered under 170.112(c)(8) or agriculture field workers covered under 170.150 of the pesticide Worker Protection Standard].

b. Forestry operations

Pesticide Worker Protection rules can be found in Division 7/A, OAR 437-007-0010.

c. All other operations

For exposure to pesticides or other agricultural chemicals in any other setting, the basic requirements for emergency eyewash and/or shower facilities as described by OAR 437-002-0161 and this Directive must be followed.

5. Miscellaneous

If the product label or material safety data sheet requires specific decontaminants or procedures, the employer must provide them in addition to the eyewash or shower. In addition, certain substances like acids, chlorine and anhydrous ammonia may require special treatment.

VI. Employee Training and Identifying the Units

A. Training

If eyewash and/or shower facilities are required, then employees must be trained according to OAR 437-001-0760(1)(d) or OAR 437-004-0099(2)(f) on the hazards associated with the material, the location of the eyewash and/or shower facilities, and the proper procedure for flushing the eyes and/or skin.

B. Identifying the Units

The eyewash and safety shower facilities should be identified with a highly visible sign. The area around the facility should be well lighted and highly visible.

VII. Violations and Severity Rating

A. The severity must relate to the type of damage the material can cause to the eyes or to other body tissues. The factors listed in Section I must be considered to appropriately determine the hazard.

B. The severity of a violation for lack of an acceptable eyewash and/or deluge shower where employees are exposed to highly corrosive materials depends on an evaluation of the adequacy or effectiveness of the personal protective equipment and/or water supply to prevent or minimize the injury, as well as the immediate access to a water supply.

C. The severity for an improperly functioning facility will be based on the ability of the unit to provide water or other appropriate alternative fluid for washing the eyes and/or the body. When the units provide little or no water, the severity must be determined as if no facility were available.

EFFECTIVE DATE: This directive is effective immediately and will remain in effect until cancelled or superseded.

REFERENCES: Program Directive Source Documents

1. American National Standard for Emergency Eyewash and Shower Equipment, ANSI Z358.1-2009.

2. Grant, W. Morton, Toxicology of the Eye, 4th Edition, Charles C. Thomas, Publisher, 1993.

3. National Academy of Sciences, National Research Council, Chlorine and Hydrogen Chloride, 1976.

4. NIOSH, Criteria for a Recommended Standard, Chlorine, May 1976.

5. NIOSH, Occupational Health Guideline for Chlorine, 1978.

6. CGA P-1-1991, Section 4.3.3 Compressed Gases

Additional Background References

1. Clayton, George D. and Clayton, Florence E., Patty's Industrial Hygiene and Toxicology, 3rd Edition Vol. 2A Toxicology, John Wiley and Sons, 1981.

2. American Chemical Council, Chemical Safety Data Sheets.

3. NIOSH, Criteria Documents.

4. NIOSH, Richard J. Lewis and Rodger L. Tatken, Registry of Toxic Effects of Chemical Substances, 2000.

5. Proctor, Nick H. and Hughes, James P., Chemical Hazards of the Workplace, 4th Edition, J. B. Lippincott Co., 1996.

6. Sax, Irving N., Dangerous Properties of Industrial Materials, 10th Edition, Van Nostrand Reinhold Co., 1999.

7. Stecher, Paul G., Editor, The Merck Index, 12th Edition, Merck and Co., Inc., 1996.

8. A. Keith Furr, Handbook of Laboratory Safety, 2nd Edition, CRC Press, 1995.