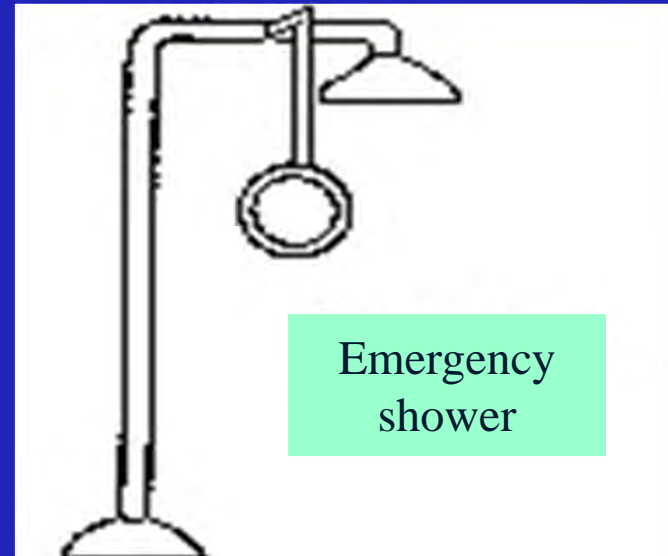


# *Emergency eyewash and showers*

Emergency eyewash



Emergency  
shower



*Prepared by:  
MNOSHA Workplace Safety Consultation  
Minnesota Department of Labor and Industry  
June 2011*



*When does OSHA require an emergency eyewash and/or shower?*

*For general industry worksites,  
29 CFR 1910.151(c) states:*

*"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."*



## *When does OSHA require an emergency eyewash and/or shower?*

*29 CFR 1910.151 applies in all general industry situations unless a vertical standard applies to a specific hazard.*

*Examples include:*

- *29 CFR 1910.124(g)(2) – dipping and coating*
- *29 CFR 1910.261(b)(2) – pulp, paper and paperboard mills*
- *29 CFR 1910.268(g)(18) – telecommunications*
- *29 CFR 1910.1048(i) – formaldehyde*
- *29 CFR 1910.1052(i) – methylene chloride*



*When does OSHA require an  
emergency eyewash and/or  
shower?*

*For construction worksites,  
29 CFR 1926.50(g) states:*

*"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."*



*When does OSHA require an emergency eyewash and/or shower?*

*29 CFR 1926.50(g) applies in all construction situations, except battery handling is addressed in 29 CFR 1926.441(a)(6), which states:*

*“Facilities for quick drenching of the eyes and body shall be provided within 25 feet (7.62 meters) of battery handling areas.”*



## *What materials require an eyewash and/or eyewash and shower?*

*Materials that can cause damage to the eyes or skin, or materials that are readily absorbed through the skin. They can be in the following forms:*

- *liquids (most common);*
- *solids;*
- *gases;*
- *vapors; and*
- *mists.*

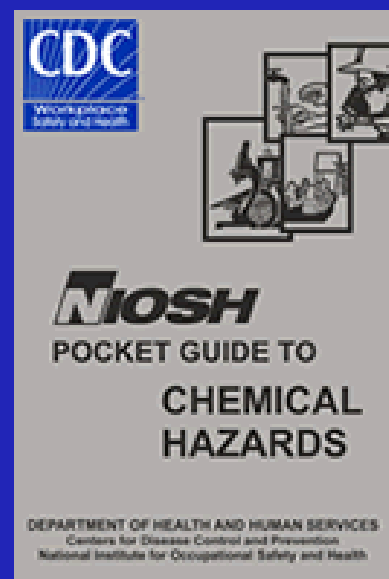
# Methods to determine if a material can damage the eye and skin or can be absorbed through the skin

- Consult the “Health hazard” section of the manufacturer’s material safety data sheet (MSDS).
  - Indications of irritation may not require eyewash or shower.
  - Indications of burns, corneal damage, blindness or eye damage will confirm the need for an emergency eyewash and/or shower if a potential for employee exposure exists.
- Directly consult with the manufacturer of the material.

The image shows a standard Material Safety Data Sheet (MSDS) form. A red arrow originates from the text 'Consult the "Health hazard" section of the manufacturer's material safety data sheet (MSDS)' and points to the 'Section VI - Health Hazard Data' section of the form. The form is divided into several sections, including: Section I - Manufacturer's Name, Section II - Hazardous Ingredients/Chemical Information, Section III - Physical/Chemical Characteristics, Section IV - Fire and Explosion Hazard Data, Section V - Reactivity Data, Section VI - Health Hazard Data, Section VII - Environmental Data, and Section VIII - Control Measures. The 'Health Hazard Data' section includes fields for Hazardous Ingredients, Health Hazard Data, and Health Hazard Statements.

# *Methods to determine if a material can damage the eye and skin or can be absorbed through the skin*

- *Consult the NIOSH "Pocket guide to chemical hazards" (NIOSH publication no. 2005-149, available at [www.cdc.gov/NIOSH](http://www.cdc.gov/NIOSH)).*
  - *If it states "Provide: eyewash and/or quick drench," an emergency eyewash and/or shower will be needed if a potential for employee exposure exists.*







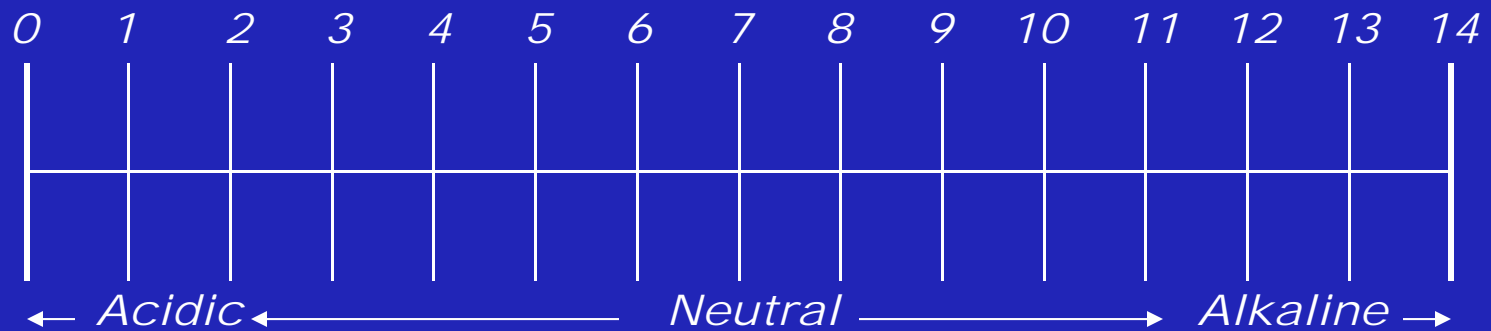
*Methods to determine if a material can damage the eye and skin or can be absorbed through the skin*

- For liquids, determine the pH of the solution (an indication of acidity or alkalinity).*

$$pH = - \log_{10} (H^+)$$

*pH is a measure of the concentration of hydrogen ions in a liquid solution.*

# The pH scale

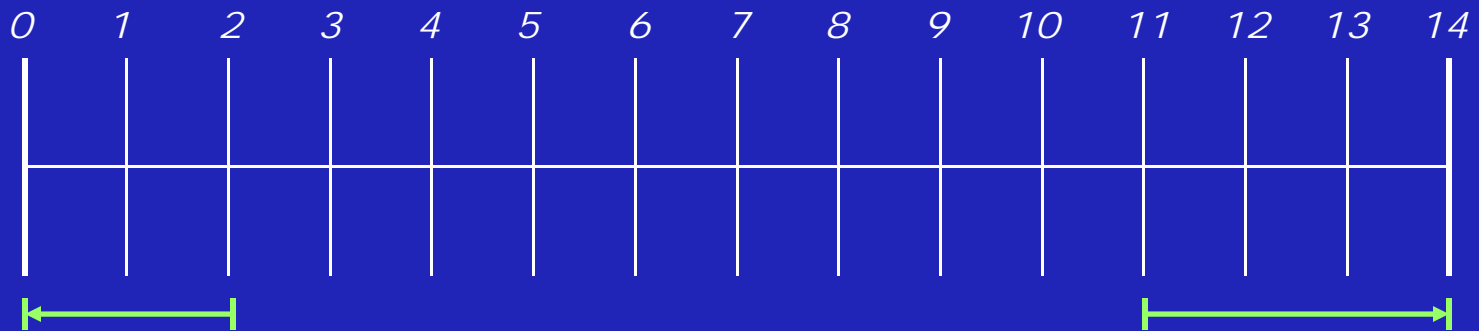


*Effect of dilution: Because of the logarithmic nature of the pH scale, a 10-fold dilution with water changes the pH by 1.*

*For example, if beginning with a solution with a pH of 14:*

- a dilution of 1 : 10 results in a pH of 13 (pH change of 1);*
- a dilution of 1 : 100 results in a pH of 12 (pH change of 2);*
- a dilution of 1 : 1,000 results in a pH of 11 (pH change of 3);*
- a dilution of 1 : 10,000 results in a pH of 10 (pH change of 4); and*
- a dilution of 1 : 100,000 results in a pH of 9 (pH change of 5).*

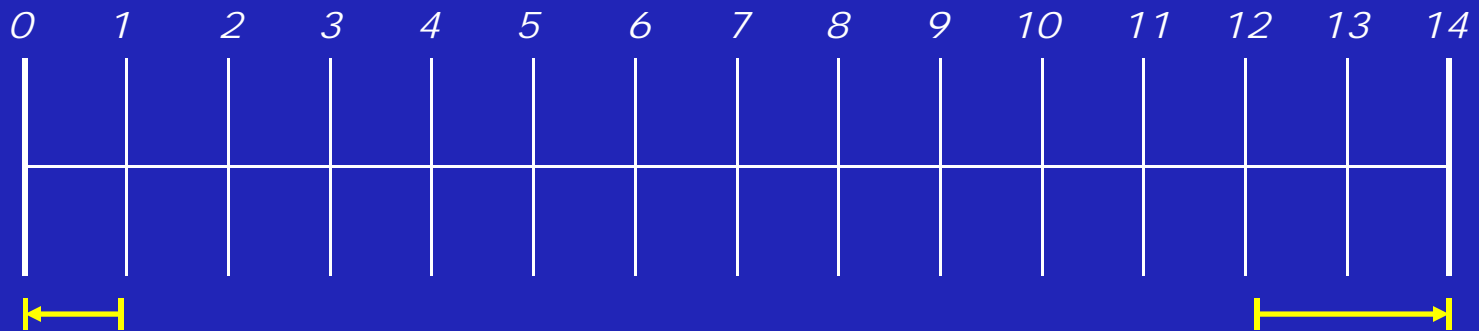
*At what pH levels does MNOSHA require an emergency eyewash?*



*Whenever an employee works with a chemical with a pH of 2 or less (very acidic) or a pH of 11 or greater (very basic or alkaline) and the manner in which the employee works with the material poses a potential for a splash or spatter to the eyes and face, an ANSI-approved emergency eyewash must be provided for access within 10 seconds of the hazard area.*

*Note: In the situation above, the employer would also have to provide – and require the use of – adequate eye and face protection (chemical splash goggles and a chin-length wrap-around face shield). The use of such personal protective equipment does not change the need for an emergency eyewash.*

*At what pH levels does MNOSHA also require an emergency shower?*



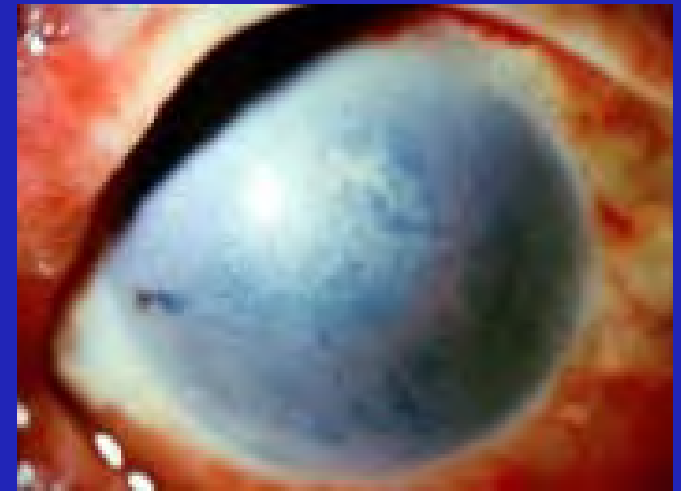
*Whenever an employee works with a chemical with a pH of 1 or less (highly acidic) or a pH of 12 or greater (highly basic or alkaline) and the manner in which the employee works with the material poses a potential for contact with the skin of the body, an ANSI-approved emergency shower must also be provided for access within 10 seconds of the hazard area.*

*Note: In the situation above, the employer would also have to provide – and require the use of – adequate skin protection (gloves, splash aprons, boots, etc). The use of such personal protective equipment does not change the need for an emergency shower.*

## *How does a material cause a chemical burn?*

Chemical burns usually do not involve the the same destruction mechanism as thermal burns.

They can destroy skin and tissues by coagulating proteins.



*Protein coagulation in the eye caused by contact with a highly alkaline liquid*

# *How does a material cause a chemical burn?*

Oxidation, reduction, corrosion and desiccation are a few of the chemical reactions responsible for the tissue damage occurring in a chemical burn.

The foreign substance causing the burn has disrupted the delicate biochemistry of the tissues, resulting in the tissue destruction.





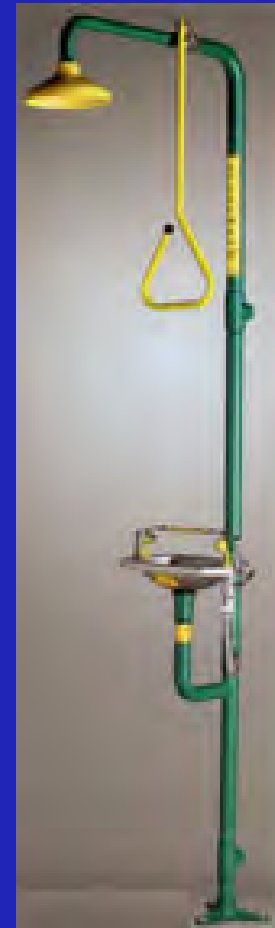
*What is considered an adequate eyewash and shower?*

*MNOSHA uses ANSI Z358.1-2009 as a guide for the construction, installation and use of emergency eyewash and shower equipment.*

## *ANSI Z358.1-2009*

### *Requirements that apply to both eyewash units and shower units*

- The sole purpose must be as an eyewash or emergency shower unit.*
- If a shower is needed, a separate eyewash is required; a combination unit is also acceptable.*





# ANSI Z358.1-2009

## Requirements that apply to both eyewash units and shower units

- *The unit must be equipped with a quick-opening valve that remains open when activated. It must be simple to operate in a time of one second or less.*
- *Once activated, both hands must be kept free to hold open the eyelids to facilitate flushing.*



## *ANSI Z358.1-2009*


### *Requirements that apply to both eyewash units and shower units*

- *The water temperature must be tepid or lukewarm (between 60° F and 100° F or between 15° C and 38° C).*
  - *For emergency eyewash units, this temperature range will ensure the eyes and face can be held in the flushing water for 15 minutes, the amount of time required to adequately flush the eyes.*
  - *For emergency shower units, this temperature range will minimize the likelihood of inducing shock.*
  - *These temperatures can be achieved through the installation of a mixing valve on hot and cold water lines.*

## *ANSI Z358.1-2009*

### *Requirements that apply to both eyewash units and shower units*

- *Travel-time between the operation where the hazardous substance is used and the unit, must be 10 seconds or fewer.*
  - *Appendix B5 of ANSI Z358.1-2009 states an average person covers a distance of approximately 55 feet in 10 seconds, when walking at a normal pace.*
  - *The unit must be on the same level as the operation in question. The climbing of stairs to reach the unit during an emergency is not allowed.*



# *ANSI Z358.1-2009*

## *Requirements that apply to both eyewash units and shower units*

- *Travel-time issues (continued):*
  - *ANSI recommends the unit be immediately adjacent to the hazard when the pH of the hazardous substance is less than or equal to 1, or equal to or greater than 12.*

*Note: When strong acids or strong alkaline materials make contact with the eyes, the damage occurs within 15 seconds. If it takes more than 10 seconds to reach the unit, it may not be effective in minimizing the likelihood of tissue damage.*

# *ANSI Z358.1-2009 Requirements that apply to both eyewash units and shower units*

- The location of the unit must be well lit, highly visible and marked with a highly visible sign.*





## *ANSI Z358.1-2009 Requirements that apply to both eyewash units and shower units*

- The unit must be operable at all times, with provisions to prevent unauthorized shutoff of the water lines to the unit.*
- A sewer connection or drain is not required, unless a special hazard is posed by water.*
- Units shall be installed in accordance with the manufacturer's instructions.*

# *ANSI Z358.1-2009 Requirements that apply only to eyewash units*

- Eyewash units must be installed so that nozzles are 33 to 45 inches (83.8 to 114.3 cm) from the floor.*
- Eyewash units must be a minimum of six inches away from the nearest wall or obstruction.*






# *ANSI Z358.1-2009*

## *Requirements that apply only to eyewash units*

- Eyewash units must provide a minimum of 0.4 gallons (1.5 liters) a minute of a potable water or commercial flush for 15 minutes.*
- Eyewash units must provide a pressure-reduced divergent flow of flushing fluid.*







# *ANSI Z358.1-2009*

## *Requirements that apply only to eyewash units*

---

- Plumbed eyewash units must be flushed weekly to remove any sediment and microbial contamination.*
- The duration of the test is dependant on the volume of water contained in the unit itself and all sections of pipework that do not form part of a constant circulation system (also known as a dead leg).*
- The test should be long enough to clear the potentially stagnant water out of the dead leg.*

# *ANSI Z358.1-2009*

## *Requirements that apply only to eyewash units*

- Where contamination can occur, nozzles must be protected from contaminants by covers (or caps) that do not require an extra step for removal beyond the activation of the unit.*



*Eyewash cover*



*Nozzle caps*

# *ANSI Z358.1-2009 Requirements that apply only to eyewash units*

- *Self-contained and portable eyewash units must provide 0.4 gallons a minute (1.5 liters a minute) for 15 minutes (six-gallon capacity).*
- *Portable eyewash units should be used only where fixed installation is not feasible.*



# *ANSI Z358.1-2009 Requirements that apply only to eyewash units*

- In self-contained and portable eyewash units, the flushing fluid must be replaced after any use.*

*In addition, the fluid must be replaced at the intervals recommended by the manufacturer.*



# *ANSI Z358.1-2009*

## *Requirements that apply only to eyewash units*

- Squeeze bottles are not acceptable eyewash units on their own. They cannot supply the required amount of water to adequately flush the eyes and their use does not keep both hands free to hold the eyelids open.*
- They can only be used as an interim protective measure, in conjunction with an approved eyewash facility, where installation difficulties are an issue.*

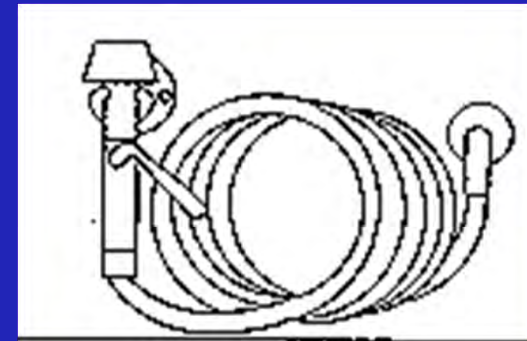


# *ANSI Z358.1-2009*

## *Requirements that apply only to eyewash units*

- In the General Requirements for Dipping and Coating Operations standard – 29 CFR 1910.124(g)(2), drench hoses are allowed in lieu of a eyewash and shower at open-surface tanks containing hazardous liquids.*


*The device must supply clean water provided by a  $\frac{3}{4}$ -inch diameter, 48-inch or longer hose with a quick-opening valve. Pressure should not exceed 25 psi.*



# *ANSI Z358.1-2009 Requirements that apply only to eyewash units*

- Many faucet-mounted eyewash devices do not meet ANSI construction requirements.*
- If use is planned, an ANSI-approved faucet-mounted eyewash must meet all requirements for plumbed eyewash units. This includes requirements for installation height, water temperature, unobstructed access, travel time, labeling, etc. Because of the need for immediate use, the water temperature at the sink must immediately meet temperature requirements at all times.*





# *ANSI Z358.1-2009*

## *Requirements that apply only to shower units*

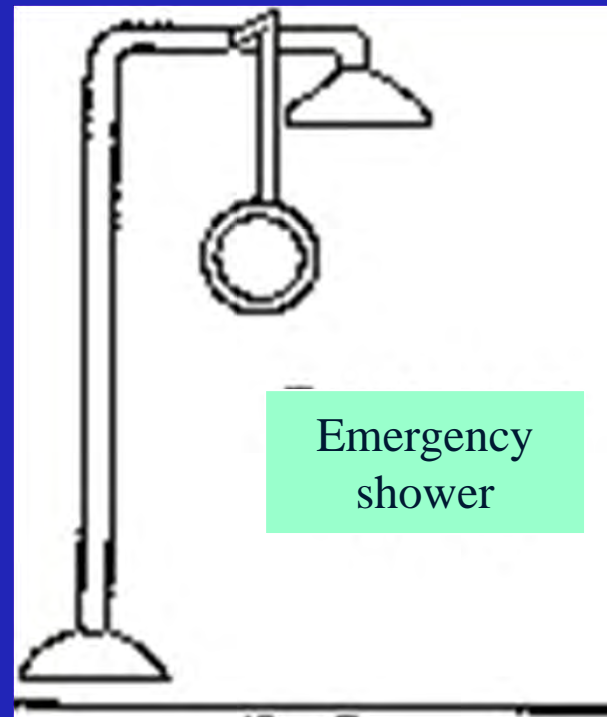
- *Showers must provide a minimum 20 gallons a minute (75.7 liters a minute) flow of flushing fluid in a dispersed pattern.*
- *Weekly checks of the shower must be conducted to flush the lines and to verify proper operation.*



# *ANSI Z358.1-2009*

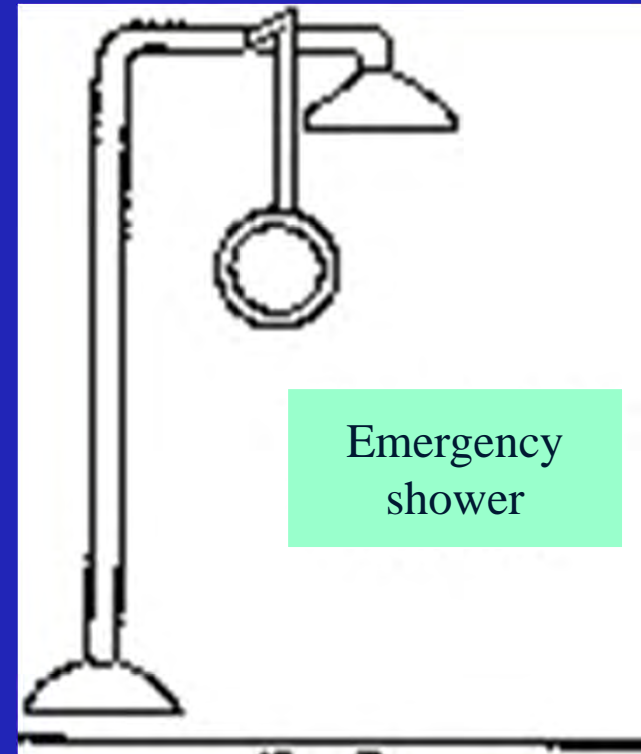
## *Requirements that apply only to shower units*

- Overhead showers should be mounted at a head height of 82 to 96 inches (208.3 to 243.8 cm) from the floor or platform.*



## *ANSI Z358.1-2009 Requirements that apply only to shower units*

- The valve actuator must not be located more than 69 inches (173.3 cm.) above the level on which the user stands.*



# *ANSI Z358.1-2009*

## *Training requirements for emergency eyewash and shower*

- Employee are to be trained about the location and proper use of emergency eyewashes and showers.*



# *ANSI Z358.1-2009*

## *Training requirements for emergency eyewash and shower*

- The training must address the holding open of the eyelids and the rolling of the eyeballs to facilitate the flushing of the entire surface of the eye.*



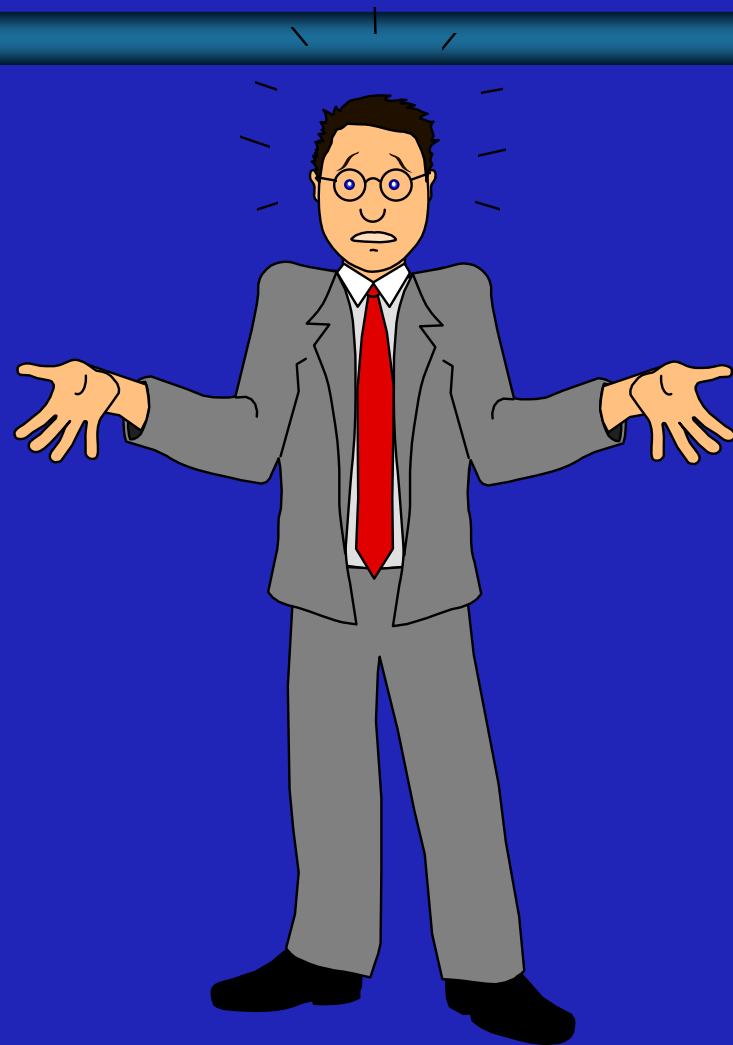
# ANSI Z358.1-2009

## Training requirements for emergency eyewash and shower

- *If squeeze bottles are provided for use as an interim protective measure, the training must address proper use in conjunction with the provided emergency eyewash.*



*Questions?*





*Thank you!*