American National Standard for
Emergency Eyewash and Shower Equipment

Secretariat
International Safety Equipment Association

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Foreword (This Foreword is not part of American National Standard ANSI Z358.1-2004)


Significant changes to the 1998 version of the standard are reflected in this document, including emphasis that drench hoses and personal wash units are supplemental equipment and an explanation on the reason for weekly operation verification for plumbed equipment. The document also provides users with an expanded appendix on recommended tepid temperatures for flushing fluid and removes certain criteria from installation requirements.

In the interest of worker safety, it is important to recognize that emergency eyewash, shower, drench hose and combination units are not a substitute for proper primary protective devices. As a defense against flying particles and splashing injurious liquids, workers should wear eye and face protection and protective clothing. Appropriate safety and health advisors should be consulted on proper first aid recommendations in addition to recommendations on the location and use of emergency eyewash and shower equipment for specific workplace hazards.

How companies and their employees respond to incidents requiring first aid treatment is an important part of emergency planning. Consideration should be given to establishing first aid response teams, installing eyewash and shower alarm devices to alert personnel when first aid equipment is in use, and simulated emergency response drills to gain valuable experience in performing first aid activities.

Although not addressed in this standard, consideration should also be given to the proper disposal of waste flushing fluids from operating emergency eyewash and shower equipment. Freezing temperatures, drainage from elevated showers and showers at grade level, and pollutants are some but not all of the considerations. Consult local, state, and federal regulations that may apply.

Suggestions for the improvement of this standard are welcome. They should be sent to the ISEA, 1901 N. Moore Street, Suite 808, Arlington, VA 22209 or isea@safetyequipment.org.

This standard was processed and approved for submittal to ANSI by the Canvass Method. The following organizations were contacted prior to the approval of this standard. Inclusion in this list does not necessarily imply that the organization concurred with the submittal of the proposed standard to ANSI.

AEM, Inc.  Lab Safety Supply
American Society of Safety Engineers  Lawrence Livermore National Laboratory
American Society of Sanitation Engineers  Leonard Valve Company
Aveca Inc.  Safety Equipment Institute
Du-all Safety  St. Louis County Department of Public Works
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American National Standard
for Emergency Eyewash and Shower Equipment

1. Scope

This standard establishes minimum performance and use requirements for eyewash and shower equipment for the emergency treatment of the eyes or body of a person who has been exposed to injurious materials. It covers the following types of equipment: emergency shower, eyewash equipment, eye/face wash equipment, and combination shower and eyewash units.

This standard also includes performance and use requirements for personal washes and drench hoses, which are considered supplemental to emergency eyewash and shower equipment.

2. Purpose

This standard is intended to provide uniform minimum requirements for the performance, use, installation, test procedures, maintenance and training of emergency eyewash and shower equipment.

3. Definitions

certification/certified: A system whereby a certification organization determines that a manufacturer has demonstrated the ability to produce a product that complies with the requirements of this standard, authorizes the manufacturer to use a label on listed products that comply with the requirements of this standard, and establishes a follow-up program conducted by the certification organization as a check on the methods the manufacturer uses to determine continued compliance of labeled and listed products with the requirements of this standard.

certification organization: An independent third party organization that determines product compliance with the requirements of this standard with a labeling/listing/follow-up program.

combination unit: An interconnected assembly of emergency equipment supplied by a single source of flushing fluid.

drench hose: A supplemental device consisting of a flexible hose connected to a flushing fluid supply and used to provide fluid to irrigate and flush face and body areas.

emergency shower: A device specifically designed and intended to deliver flushing fluid in sufficient volume to cause that fluid to cascade over the entire body.

eye/face wash: A device used to provide fluid to irrigate and flush both the face and the eyes simultaneously.

eyewash: A device used to provide fluid to irrigate and flush the eyes.

flow pressure: The pressure in the water supply pipe near the water outlet while the faucet or outlet is fully open and flowing.

flow regulator: A mechanical device to control the flow of flushing fluid through pipes.

flushing fluid: Potable water, preserved water, preserved buffered saline solution or other medically acceptable solution manufactured and labeled in accordance with applicable government regulations.

freeze protected equipment: Equipment designed to allow the emergency device to operate under freezing conditions.

freeze protection: A means to protect water in an apparatus from freezing and rendering it inoperable. This can be achieved through several means including mechanical valves and electrical heat tracing.

hazardous material: Any substance or compound that has the capability of producing adverse effects on the health and safety of humans.
personal wash: A supplementary device that supports plumbed and/or self-contained units, by delivering immediate flushing fluid to the eyes or body.

potable water: Water that is suitable for drinking.

self-closing valve: A valve that closes automatically when released by the user.

self-contained eyewash: A stand-alone eyewash device containing flushing fluid.

self-contained shower: A stand-alone shower containing flushing fluid.

stay-open valve: A valve that, once activated, must be closed manually by the user.

tepid: Moderately warm; lukewarm.

valve actuator: Device connected to the valve to facilitate its operation.

4. Plumbed and Self-Contained Emergency Showers (See Illustration 1)

4.1 Performance of Plumbed and Self-Contained Showers

4.1.1 A means shall be provided to ensure that a controlled flow of flushing fluid is provided at a velocity low enough to be non-injurious to the user.

4.1.2 Emergency showers shall be designed and located so that a flushing fluid column is provided that is not less than 208.3 cm (82 in.) nor more that 243.8 cm (96 in.) in height from the surface on which the user stands.

4.1.3 Plumbed and self-contained shower equipment shall be constructed of materials that will not corrode in the presence of the flushing fluid. Stored flushing fluid shall be protected against airborne contaminants.

4.1.4 Plumbed and self contained shower equipment shall be capable of delivering flushing fluid at a minimum of 75.7 liters per minute (20 gpm) for a minimum of 15 minutes. If shut off valves are installed in the supply line for maintenance purposes, provisions shall be made to prevent unauthorized shut off.

4.1.5 The spray pattern shall have a minimum diameter of 50.8 cm (20 in.) at 152.4 cm (60 in.) above the surface on which the user stands, and the center of the spray pattern shall be located at least 40.6 cm (16 in.) from any obstruction. The flushing fluid shall be substantially dispersed throughout the pattern.

NOTE: The eyewash section of a combination shower/eyewash station is not considered an "obstruction" in this context to allow for simultaneous use of shower and eyewash equipment. See Section 7.

4.2 Performance of Control Valve

The valve shall remain open without the use of the operator's hands until intentionally closed. The valve shall be simple to operate and shall go from "off" to "on" in 1 second or less. The valve shall be resistant to corrosion. Manual or automatic actuators shall be easy to locate and readily accessible to the user. Valve actuators shall be located not more than 173.3 cm (69 in.) above the level on which the user stands.

4.3 Shower Enclosures

Enclosures, if used, shall provide for a minimum unobstructed area of 86.4 cm (34 in.) in diameter.

4.4 Performance Testing Procedures

4.4.1 Plumbed Emergency Showers

Plumbed emergency showers shall be certified as follows:

(1) Connect a flowmeter to the shower to be tested, or provide other means of measuring flushing fluid flow.

(2) Attach the shower to an uninterruptible flushing fluid supply of 75.7 liters per minute (20 gpm) at 30 psi. The shower head's height shall be not less than 208.3 cm (82 in.) nor more that 243.8 cm (96 in.) from the surface on which the user stands. The
flushing fluid supply shall have a control valve or pump system that can be adjusted.

(3) Open the valve on the emergency shower and verify that it opens in one second and stays open.

(4) Adjust the control valve on the flushing fluid supply to deliver a minimum of 75.7 liters per minute (20 gpm), and determine that flushing fluid is substantially dispersed throughout the pattern. Measure the diameter of the flushing fluid pattern 152.4 cm (60 in.) above the surface on which the user stands. The diameter shall be a minimum of 50.8 cm (20 in.).

4.4.2 Self-contained Emergency Showers

Self-contained emergency showers shall be certified as follows:

(1) Fill the unit with flushing solution.

(2) Connect a flowmeter to the shower to be tested or provide other means of measuring flushing fluid flow.

(3) Place the unit in operating position. The shower head's height shall be not less than 208.3 cm (82 in.) nor more than 243.8 cm (96 in.) from the surface on which the user stands.

(4) Throughout the 15 minute test, ensure that the unit is capable of delivering a minimum of 75.7 liters per minute (20 gpm) and that the flushing fluid is substantially dispersed throughout the pattern. The diameter of the spray pattern shall be 50.8 (20 in.) at a point 152.4 cm (60 in.) above the surface on which the user stands.

4.5 Installation

It is the installer's responsibility to ensure that emergency showers shall:

4.5.1 Be assembled and installed in accordance with the manufacturer's instructions.

4.5.2 Be in accessible locations that require no more than 10 seconds to reach. The shower shall be located on the same level as the hazard and the path of travel shall be free of obstructions that may inhibit the immediate use of the equipment. (See Appendix B5)

4.5.3 Be located in an area identified with a highly visible sign positioned so the sign shall be visible within the area served by the shower. The area around the emergency shower shall be well-lit.

4.5.4 Be positioned so that the shower head is not less than 208.3 cm (82 in.) nor more than 243.8 cm (96 in.) from the surface on which the user stands.

4.5.5 Be connected to a supply of flushing fluid capable of delivering a minimum of 20 gpm to produce the required spray pattern for a minimum period of fifteen minutes. Where the possibility of freezing conditions exists, equipment shall be protected from freezing or freeze-protected equipment shall be installed. If shut off valves are installed in the shower line for maintenance purposes, provisions shall be made to prevent unauthorized shut off.

4.5.6 Deliver tepid flushing fluid. In circumstances where chemical reaction is accelerated by flushing fluid temperature, a facilities safety/health advisor should be consulted for the optimum temperature for each application. (See Appendix B6)

4.5.7 When the shower is installed, its performance shall be verified in accordance with the following procedures:

(1) With the unit correctly connected to the flushing fluid source and the valve(s) closed, visually check the piping connections for leaks.

(2) Open the valve to the full open position. The valve shall remain open without requiring further use of the operator's hands.

(3) With the valve in the "full on" position, measure the diameter of the spray pattern. It shall be a minimum of 50.8 cm (20 in.) at 152.4 cm (60 in.) above the standing surface. The center of the spray shall be at least 40.6 cm (16 in.) from any obstructions.
The flushing fluid shall be substantially dispersed throughout the pattern.

(4) Using the flowmeter or other means, determine that the rate of flow is at least 75.7 liters per minute (20 gpm).

4.6 Maintenance and Training

4.6.1 Manufacturers shall provide operation, inspection and maintenance instructions with shower equipment. Instructions for all emergency equipment shall be readily accessible to maintenance and training personnel.

4.6.2 Plumbed shower equipment shall be activated weekly for a period long enough to verify operation and ensure that flushing fluid is available.

NOTE: The intent is to ensure that there is a flushing fluid supply at the head of the device and to clear the supply line of any sediment build-up that could prevent fluid from being delivered to the head of the device and minimize microbial contamination due to sitting water.

4.6.3 Self-contained shower equipment shall be visually checked to determine if flushing fluid needs to be changed or supplemented.

4.6.4 Employees who may be exposed to hazardous materials shall be instructed in the location and proper use of emergency shower units.

4.6.5 All shower units shall be inspected annually to assure conformance with ANSI Z358.1 Section 4 requirements.

5. Plumbed and Self-Contained Eyewash Equipment (See Illustrations 2, 3a, 3b)

5.1 Performance of Plumbed and Self-Contained Eyewash Units

5.1.1 A means shall be provided to ensure that a controlled flow of flushing fluid is provided to both eyes simultaneously at a velocity low enough to be non-injurious to the user.

5.1.2 The eyewash unit shall be designed and positioned in such a way as to pose no hazard to the user.

5.1.3 Nozzles shall be protected from airborne contaminants. Whatever means is used to afford such protection, its removal shall not require a separate motion by the operator when activating the unit.

5.1.4 The eyewash unit shall be designed, manufactured and installed in such a manner that, once activated, it can be used without requiring the use of the operator's hands.

5.1.5 Plumbed and self-contained units shall be constructed of materials that will not corrode in the presence of the flushing fluid. Stored flushing fluid shall be protected against airborne contaminants.

5.1.6 Plumbed and self-contained eyewash equipment shall be capable of delivering flushing fluid to the eyes not less than 1.5 liters per minute (0.4 gpm) for 15 minutes. If shut off valves are installed in the supply line for maintenance purposes, provisions shall be made to prevent unauthorized shut off.

5.1.7 The eyewash unit shall be designed to provide enough room to allow the eyelids to be held open with the hands while the eyes are in the flushing fluid stream.

5.1.8 The eyewash unit shall provide flushing fluid to both eyes simultaneously. A test gauge for making determination of a suitable eyewash pattern shall be a minimum 10.16 cm (4 in.) in length with two sets of parallel lines equidistant from the center (See Illustration 3c). The interior set of lines shall be 3.18 cm (1.25 in.) apart and the exterior lines shall be 8.28 cm (3.25 in.) apart. Place the gauge on top of the stream of the eyewash. The flushing fluid should cover the areas between the interior and exterior lines when the gauge is lowered not more than 3.81 cm (1.5 in.) below the fluid's peak.

5.2 Performance of Control Valve

The valve shall remain open without the use of the operator's hands until intentionally closed. The valve shall be simple to operate and shall go from "off" to "on" in 1 second or less. The valve
shall be resistant to corrosion. Manual or automatic actuators shall be easy to locate and readily accessible to the user.

5.3 Performance Testing Procedures

5.3.1 Plumbed Eyewash Units

Plumbed eyewash units shall be certified as follows:

(1) Connect a flowmeter to the eyewash unit to be tested, or provide other means of measuring flushing fluid flow.

(2) Attach the eyewash to an uninterruptible flushing fluid supply of 1.5 liters per minute (0.4 gpm) at 30 psi.

(3) Open the valve on the eyewash unit and verify that it opens in one second and stays open.

(4) Using the flowmeter or other means, determine that the rate of flow is at least 1.5 liters per minute (0.4 gpm) that the flushing streams rise to approximately equal heights, and that the flushing fluid will wash both eyes simultaneously at a velocity low enough to be non-injurious to the user.

5.3.2 Self-contained Eyewash Units

Self-contained units shall be certified. For example:

(1) Position the emergency eyewash unit in the operating position so that the discharged flushing fluid can be collected. Fill the unit with flushing fluid.

(2) Open the valve on the eyewash unit and verify that it opens in one second and stays open.

(3) Throughout the 15 minute test, ensure that the unit is capable of delivering a minimum of 1.5 liters per minute (0.4 gpm) and that the flushing fluid meets the minimum flow characteristics as measured with the eyewash gauge represented in Illustration 3c.

5.4 Installation

It is the installer's responsibility to ensure that eyewash units shall:

5.4.1 Be assembled and installed in accordance with the manufacturer's instructions.

5.4.2 Be in accessible locations that require no more than 10 seconds to reach. The eyewash unit shall be located on the same level as the hazard and the path of travel shall be free of obstructions that may inhibit the immediate use of the equipment. For a strong acid or strong caustic, the eyewash should be immediately adjacent to the hazard. (See Appendix B5)

5.4.3 Be located in an area identified with a highly visible sign positioned so the sign shall be visible within the area served by the eyewash. The area around the eyewash shall be well-lit.

5.4.4 Be positioned with the flushing fluid nozzles not less than 83.8 cm (33 in.) and no greater than 114.3 cm (45 in.) from the surface on which the user stands and 15.3 cm (6 in.) minimum from the wall or the nearest obstruction.

5.4.5 Be connected to a supply line providing an uninterruptible supply of flushing fluid at a minimum 1.5 liters per minute (0.4 gpm). Where the possibility of freezing conditions exist, equipment shall be protected from freezing or freeze-protected equipment shall be installed. If shut off valves are installed in the supply line for maintenance purposes, provisions shall be made to prevent unauthorized shut off.

5.4.6 Deliver tepid flushing fluid. In circumstances where chemical reaction is accelerated by flushing fluid temperature, a facilities safety/health advisor should be consulted for the optimum temperature for each application. (See Appendix B6)

5.4.7 When the plumbed eyewash is installed, its performance shall be verified in accordance with the following procedures:

(1) With the unit correctly connected to the flushing fluid source and the valve(s) closed, visually check the piping connections for leaks.
(2) Open the valve to the full open position. The valve shall remain open without requiring further use of the operator's hands.

(3) With the valve in the "full on" position, make sure that both eyes will be washed simultaneously at a velocity low enough to be non-injurious to the user.

(4) Using the flowmeter or other means, determine that the rate of flow is at least 1.5 liters per minute (0.4 gpm). A test gauge similar to the one pictured in Illustration 3c can be used to verify minimum flow characteristics.

5.5 Maintenance and Training

5.5.1 Manufacturers shall provide operation, inspection and maintenance instructions with eyewash equipment. Instructions for all emergency equipment shall be readily accessible to maintenance and inspection personnel.

5.5.2 Plumbed eyewash equipment shall be activated weekly for a period long enough to verify operation and ensure that flushing fluid is available.

NOTE: The intent is to ensure that there is a flushing fluid supply at the head of the device and to clear the supply line of any sediment build-up that could prevent fluid from being delivered to the head of the device and minimize microbial contamination due to sitting water.

5.5.3 Self-contained eyewash equipment shall be visually checked to determine if flushing fluid needs to be changed or supplemented.

5.5.4 Employees who may be exposed to hazardous materials shall be instructed in the location and proper use of emergency eyewash units.

5.5.5 All eyewash units shall be inspected annually to assure conformance with ANSI Z358.1 section 5 requirements.

6. Eye/Face Wash Equipment (See Illustration 4)

6.1 Performance of Eye/Face Wash Units

6.1.1 A means shall be provided to ensure that a controlled flow of flushing fluid is provided to both eyes and face simultaneously at a velocity low enough to be non-injurious to the user.

6.1.2 The eye/face wash units shall be designed and positioned in such a way as to pose no hazard to the user.

6.1.3 Nozzles shall be protected from airborne contaminants. Whatever means is used to afford such protection, its removal shall not require a separate motion by the operator when activating the unit.

6.1.4 The eye/face wash unit shall be designed, manufactured and installed in such a manner that, once activated, it can be used without requiring the use of the operator's hands.

6.1.5 Eye/face wash units shall be constructed of materials that will not corrode in the presence of the flushing fluid. Stored flushing fluid shall be protected against airborne contaminants.

6.1.6 Eye/face wash equipment shall be capable of delivering flushing fluid to the eyes not less than 11.4 liters per minute (3.0 gpm) for 15 minutes. If shut off valves are installed in the line for maintenance purposes, provisions shall be made to prevent unauthorized shut off.

6.1.7 The eye/face wash unit shall be designed to provide enough room to allow the eyelids to be held open with the hands while the eyes are in the flushing fluid stream.

6.1.8 The eye/face wash unit shall provide flushing fluid to both eyes simultaneously. A test gauge for making determination of a suitable eyewash pattern shall be a minimum 10.16 cm (4 in.) in length with two sets of parallel lines equidistant from the center (See Illustration 3c). The interior set of lines shall be 3.18 cm (1.25 in.) apart and the exterior lines shall be 8.26 cm (3.25 in.) apart. Place the gauge on top of the stream of the eyewash. The flushing fluid should
cover the areas between the interior and exterior lines when the gauge is lowered not more than 3.81 cm (1.5 in.) below the fluid's peak.

6.2 Performance of Control Valve

The valve shall remain open without the use of the operator's hands until intentionally closed. The valve shall be simple to operate and shall go from "off" to "on" in 1 second or less. The valve shall be resistant to corrosion. Manual or automatic actuators shall be easy to locate and readily accessible to the user.

6.3 Performance Testing Procedures

Eye/face wash units shall be certified as follows:

1. Connect a flowmeter to the eye/face wash to be tested, or provide other means of measuring flushing fluid flow.
2. Attach the eye/face wash to an uninterruptible flushing fluid supply of 11.4 liters per minute (3.0 gpm) at 30 psi.
3. Open the valve on the eye/face wash unit and verify that it opens in one second and stays open.
4. Using the flowmeter or other means, determine that the rate of flow is at least 11.4 liters per minute (3.0 gpm), that the flushing streams rise to approximately equal heights, and that the flushing fluid will wash both eyes simultaneously at a velocity low enough to be non-injurious to the user.

6.4 Installation

It is the installer's responsibility to ensure that eye/face wash units shall:

6.4.1 Be assembled and installed in accordance with the manufacturer's instructions.

6.4.2 Be in accessible locations that require no more than 10 seconds to reach. The eye/face wash shall be located on the same level as the hazard and the path of travel shall be free of obstructions that may inhibit the immediate use of the equipment. For a strong acid or strong caustic, the eye/face wash should be immediately adjacent to the hazard. (See Appendix B5)

6.4.3 Be located in an area identified with a highly visible sign positioned so the sign shall be visible within the area served by eye/face wash. The area around the eye/face wash shall be well-lit.

6.4.4 The unit shall be positioned with the nozzle(s) not less than 83.8 cm (33 in.) and no greater than 114.3 cm (45 in.) from the level on which the user stands and 15.3 cm (6 in.) minimum from the wall or nearest obstruction.

6.4.5 Be connected to a supply line providing an uninterruptible supply of flushing fluid at a minimum 11.4 liters per minute (3.0 gpm). Where the possibility of freezing conditions exists, equipment shall be protected from freezing or freeze-protected equipment shall be installed. If shut off valves are installed in the supply line for maintenance purposes, provisions shall be made to prevent unauthorized shut off.

6.4.6 Deliver tepid flushing fluid. In circumstances where chemical reaction is accelerated by flushing fluid temperature, a facilities safety/health advisor should be consulted for the optimum temperature for each application. (See Appendix B6)

6.4.7 When the plumbed eye/face wash is installed, its performance shall be verified in accordance with the following procedures:

1. With the unit correctly connected to the flushing fluid source and the valve(s) closed, visually check the piping connections for leaks.
2. Open the valve to the full open position. The valve shall remain open without requiring further use of the operator's hands.
3. With the valve in the "full on" position make sure that both eyes will be washed simultaneously at a velocity low enough to be non-injurious to the user.
4. Using the flowmeter or other means, determine that the rate of flow is at least 11.4 liters per minute (3.0 gpm). A test gauge similar to the one pictured in Illustration 3c can be used to verify minimum flow characteristics.
6.5 Maintenance and Training

6.5.1 Manufacturers shall provide operation, inspection and maintenance instructions with eye/face wash equipment. Instructions for all emergency equipment shall be readily accessible to maintenance and inspection personnel.

6.5.2 Plumbed equipment shall be activated weekly for a period long enough to verify operation and ensure that flushing fluid is available.

NOTE: The intent is to ensure that there is a flushing fluid supply at the head of the device and to clear the supply line of any sediment build-up that could prevent fluid from being delivered to the head of the device and minimize microbial contamination due to sitting water.

6.5.3 Self-contained eye/face wash equipment shall be visually checked to determine if flushing fluid needs to be changed or supplemented.

6.5.4 Employees who may be exposed to hazardous materials shall be instructed in the location and proper use of eye/face wash units.

6.5.5 All eye/face wash units shall be inspected annually to assure conformance with ANSI Z358.1 section 6 requirements.

7. Combination Units (See Illustration 5)

7.1 Performance of Combination Units

7.1.1 Showers shall meet the performance requirements of Section 4.

7.1.2 Eyewash units shall meet the performance requirements of Section 5.

7.1.3 Eye/face wash units shall meet the performance requirements of Section 6.

7.1.4 Hand-held drench hoses shall meet the performance requirements of Section 8.2.

7.2 Performance of Control Valve

Each valve shall meet the applicable requirements of Sections 4, 5, 6, and 8.2.2, depending on which of the components listed in Section 7.1 are included.

7.3 Performance Testing Procedures

Each part of the unit individually shall be certified in accordance with the procedures outlined in Sections 4, 5, and 6, depending on which of the components listed in Section 7.1 are included.

7.4 Installation

It is the installer's responsibility to ensure that combination units shall:

7.4.1 Be assembled and installed in accordance with the manufacturer’s instructions.

7.4.2 Be in accessible locations that require no more than 10 seconds to reach. The combination unit shall be located on the same level as the hazard and the path of travel shall be free of obstructions that may inhibit the immediate use of the equipment.

7.4.3 Be located in an area identified with a highly visible sign positioned so the sign shall be visible within the area served by the combination unit. The area around the combination unit shall be well-lit.

7.4.4 Be connected to a system capable of supplying adequate flushing fluid to meet the requirements of each component as outlined in Sections 4, 5, and 6, when all components are operated simultaneously. Combination unit components shall be positioned so that components may be used simultaneously by the same user. Where the possibility of freezing conditions exists, equipment shall be protected from freezing or freeze-protected equipment shall be installed.

7.4.5 Deliver tepid flushing fluid. In circumstances where chemical reaction is accelerated by flushing fluid temperature, a facilities safety/health advisor should be consulted for the optimum temperature for each application. (See Appendix B6)

7.4.6 When the combination unit is installed, its performance shall be verified in accordance with the following procedures:
(1) With the unit correctly connected to the flushing fluid source and the valve(s) closed, visually check the piping connections for leaks.

(2) Open the shower and eyewash or eye/face wash valves to the full open position. The valves shall remain open without requiring further use of the operator’s hands.

(3) Activate the valves and check the performance of the shower, eyewash and eye/face wash valves as described in Sections 4.5.7, 5.4.7 and 6.4.7 respectively, while operating simultaneously.

7.5 Maintenance and Training

7.5.1 Manufacturers shall provide operation, inspection and maintenance instructions with combination equipment. Instructions for all emergency equipment shall be readily accessible to maintenance and inspection personnel.

7.5.2 Plumbed equipment shall be activated weekly for a period long enough to verify operation and ensure that flushing fluid is available.

NOTE: The intent is to ensure that there is a flushing fluid supply at the head of the device and to clear the supply line of any sediment build-up that could prevent fluid from being delivered to the head of the device and minimize microbial contamination due to sitting water.

7.5.3 Self-contained combination units shall be visually checked to determine if flushing fluid needs to be changed or supplemented.

7.5.4 Employees who may be exposed to hazardous materials shall be instructed in the location and proper use of combination units.

7.5.5 All combination units shall be inspected annually to assure conformance with ANSI Z358.1 Section 7 requirements.

8. Supplemental Equipment

The supplemental equipment listed below shall provide immediate flushing to support plumbed and self-contained equipment but shall not replace them.

8.1 Personal Wash Units (See Illustration 6)

8.1.1 Performance of Personal Wash Units

8.1.1.1 Personal wash units shall have the capacity to deliver immediate flushing fluid without being injurious to the user. Personal wash units do not meet the criteria of plumbed or self-contained eyewash equipment.

8.1.1.2 Personal wash units shall deliver tepid flushing fluid. In circumstances where chemical reaction is accelerated by flushing fluid temperature, a facilities safety/health advisor should be consulted for the optimum temperature for each application. (See Appendix B6)

8.1.1.3 Instructions and expiration date shall be permanently affixed to the unit.

8.1.2 Maintenance, Training and Storage

8.1.2.1 Manufacturers shall provide operation, inspection and maintenance instructions with personal wash units. Instructions for all emergency equipment shall be readily accessible to maintenance and inspection personnel.

8.1.2.2 All personal wash units shall be inspected and maintained in accordance with manufacturer’s instructions.

8.1.2.3 Employees shall be instructed in the location, proper use and application of personal wash units.

8.1.2.4 All personal wash units shall be inspected annually to assure conformance with ANSI Z358.1 Section 8.1 requirements.

8.2 Drench Hoses (See Illustration 7)

8.2.1 Performance of Drench Hoses

Drench hoses shall be designed to provide a controlled flow of flushing fluid to a portion of the body at a velocity low enough to be non-injurious to the user.
NOTE: A drench hose may be considered an eyewash or eye/face wash if the device meets the performance requirements of Section 5 and/or Section 6.

8.2.2 Performance of Control Valve

The valve shall be simple to operate and shall go from "off" to "on" in 1 second or less. The valve shall be resistant to corrosion. Manual or automatic actuators shall be easy to locate and readily accessible to the user.

8.2.3 Installation

It is the installer's responsibility to ensure that drench hoses shall:

8.2.3.1 Be assembled and installed in accordance with the manufacturer's instructions.

8.2.3.2 Be located in an area identified with a highly visible sign positioned so the sign shall be visible within the area served by the drench hose. The area around the drench hose shall be well-lit, and free of debris that may inhibit the immediate use of the equipment.

8.2.3.3 The unit shall be connected to a supply of flushing fluid. Where the possibility of freezing conditions exists, equipment shall be protected from freezing or freeze-protected equipment shall be installed.

8.2.3.4 Deliver tepid flushing fluid. In circumstances where chemical reaction is accelerated by flushing fluid temperature, a facilities safety/health advisor should be consulted for the optimum temperature for each application.

8.2.4 Maintenance and Training

8.2.4.1 Manufacturers shall provide operation, inspection and maintenance instructions with drench hose equipment. Instructions for all emergency equipment shall be readily accessible to maintenance and inspection personnel.

8.2.4.2 Plumbed equipment shall be activated weekly for a period long enough to verify operation and ensure that flushing fluid is available.

NOTE: The intent is to ensure that there is a flushing fluid supply at the head of the device and to clear the supply line of any sediment build-up that could prevent fluid from being delivered to the head of the device and minimize microbial contamination due to sitting water.

8.2.4.3 Employees who may be exposed to hazardous materials shall be instructed in the location and proper use of drench hose units.
Illustration 1
Emergency Shower
MINIMUM DISTANCE FROM WALL OR OBSTRUCTION
6 in

33 in – 45 in
HEIGHT FROM FLOOR

Illustration 2
Plumbed Eyewash
Illustration 3b
Pressurized Self-Contained Eyewash
Illustration 3c
Typical Eyewash Gauge
Illustration 5
Combination Shower and Eyewash
Illustration 7
Drench Hose
Appendices (The appendices are not part of American National Standard Z358.1-2004, but are included for information only.)

APPENDIX A – SAFETY CONSIDERATIONS

A1. Personal Wash Unit

The first seconds following an eye injury are often critical to keeping eye injury to a minimum. A personal wash unit may be kept in the immediate vicinity of employees working in a potentially hazardous area. The main purpose of these units is to supply immediate flushing. With this accomplished, the injured individual should then proceed to a plumbed or self-contained eyewash and flush the eyes for the required 15-minute period.

A2. First Aid Practices

A physician or other appropriate professional should provide guidance on specific workplace hazards and should provide instruction on the use of emergency eyewash and shower equipment.

A3. Waste Disposal

Consideration should be given to the proper disposal of waste flushing fluids from operating emergency eyewash and shower equipment. Freezing temperatures, drainage, elevated showers and pollutants are some, but not all, of the considerations. Consult authorities for assistance with applicable local, state and federal regulations.

A4. Personal Protective Equipment

Emergency eyewash, shower, drench hose and combination units are not substitutes for proper primary protective devices. As a defense against flying solid particles and splashing injurious liquids, workers should wear personal protective equipment as needed, including eye protection, face protection and protective clothing.

APPENDIX B – INSTALLATION CONSIDERATIONS

B1. Supply Lines

Installation procedures should be in accordance with proper plumbing practices and supply piping adequately sized to meet flow requirements. If shut off valves are installed for maintenance purposes, provisions should be made to prevent unauthorized shutoff.

B2. Water Capacity

It will be noted throughout ANSI Z358.1-2004 that minimum water capacities are rated at an inlet supply pressure of 0.207 megapascals (30 lb./sq. in.). This inlet pressure is below what is normally considered a proper level for design of plumbing systems (0.310 megapascals [45 lb./sq. in.]), but has been chosen because meeting the installation requirements may place units at unusual distances from and elevations above normal supply lines. In such cases, it is the responsibility of the designer and owner to ensure proper flushing fluid delivery at possible low points of pressure in the plumbing system. Excess pressure can deliver water to the equipment at velocities that could injure the user or render the equipment inoperable. Caution should be exercised with pressures over 0.552 megapascals (80 lb./sq. in.).

B3. Valve Operation

In the interest of safety, a control valve remaining open is most desirable to allow the user the use of both hands for disrobing or holding the eyes open. However, a self-closing valve may be permitted in a school laboratory situation as a limited exception only where the enforcing authority is of the opinion that the hazard posed is not a serious threat.

B4. Alarm Devices

In addition to the equipment identification required by ANSI Z358.1-2004, users may also
want to use audible alarms or blinking lights to indicate that the unit is in operation. These are particularly important in remote areas. Many companies connect valves electrically to warning lights or buzzers in central dispatch areas to alert the appropriate authorities when the unit is in use.

B5. Placement of Emergency Equipment

Emergency eyewash and shower equipment should be available for immediate use, but in no instance should it take an individual longer than 10 seconds to reach the nearest facility.

There are several factors that might influence the location of emergency facilities. It is recognized that the average person covers a distance of approximately 55 ft. in 10 seconds when walking at a normal pace. The physical and emotional state of a potential victim (visually impaired, with some level of discomfort/pain, and possibly in a state of panic) should be considered along with the likelihood of personnel in the immediate area to assist. The installer should also consider other potential hazards that may be adjacent to the path of travel that might cause further injury.

A door is considered to be an obstruction. Where the hazard is not corrosive, one intervening door can be present so long as it opens in the same direction of travel as the person attempting to reach the emergency equipment and the door is equipped with a closing mechanism that cannot be locked to impede access to the equipment.

In situations that might warrant the placement of flushing equipment close to the hazard, such as exposure to highly corrosive chemicals, the appropriate professional should be contacted for advice on the proper distances. Equipment should be located adjacent to the hazard, but situated in such a manner such that exposure to the splash hazard or other hazards (e.g., exposed electrical conductors) does not occur while using the eyewash.

B6. Delivered Flushing Fluid Temperature

Continuous and timely irrigation of affected tissues for the recommended irrigation period are the principal factors in providing first aid treatment. Providing flushing fluid at temperatures conducive to use for the recommended irrigation period is considered an integral part of providing suitable facilities. Medical recommendations suggest a flushing fluid at tepid temperatures be delivered to affected chemically-injured tissue. Temperatures in excess of 38°C (100°F) have proven to be harmful to the eyes and can enhance chemical interaction with the eyes and skin.

While cold flushing fluid temperatures provide immediate cooling after chemical contact, prolonged exposure to cold fluids affect the ability to maintain adequate body temperature and can result in the premature cessation of first aid treatment. Recent information indicates that a temperature of 60°F is suitable for the lower parameter for tepid flushing fluid without causing hypothermia to the equipment user.
REFERENCES

Independent study results: Placement Dimension Verification, provided by Anthrotech, Yellow Springs, OH, 2002


United States Coast Guard lifesaving and fire safety standards for commercial ships and recreational boats – Cold Water Survival