

A Guide to the ANSI Z358.1-2004 Standard

ANSI Z358.1-2004 Standard

On January 8, 2004, the American National Standards Institute (ANSI) released its 2004 update to the Z358.1 standard, the first revision to the standard since 1998. The ANSI Z358.1 standard sets the guidelines for safety equipment fixtures and installation practices. The standard is periodically reviewed to ensure the best safety parameters are in place. A breakout is provided in different sections of the standard for plumbed and self-contained emergency showers, plumbed and self-contained eyewash equipment, eye/face wash equipment, combination units and supplemental equipment. Each section addresses how the equipment should perform, as well as testing procedures to ensure proper operation, installation, maintenance and training. Illustrations and appendices are also provided throughout the standard for further clarification. However, it should be noted the appendices are not considered part of the standard, but helpful recommendations in meeting the standard's requirements.

Importance of the ANSI Standard

The General Requirements in section 29 CFR (Code of Federal Regulations) 1910.151 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."

The ANSI Z358.1 standard further clarifies what the minimum requirements for "suitable facilities" are since the Code of Federal Regulations does not offer further documentation. While ANSI Z358.1 is considered a voluntary standard, the Occupational Safety and Health Administration (OSHA) often uses it as a guide when inspecting facilities. As a result, the ANSI Z358.1 standard has gained significant importance within the safety industry. By not complying with the ANSI standard, OSHA may elect to impose penalties from warnings and fines to rare plant shutdowns. Of even greater concern is the health and safety of employees that may unnecessarily be in harm's way if proper precautions are not in place.

Requirements for the ANSI Z358.1-2004

Each of the five sections of the ANSI Z358.1-2004 standard, which include plumbed and self-contained emergency showers, plumbed and self-contained eyewash equipment, eye/face wash equipment, combination units and supplemental equipment, has particular requirements. A few of these requirements have undergone significant changes from the ANSI Z358.1-1998 to the ANSI Z358.1-2004. Most of the standard has remained unchanged. Modifications are clearly documented in each of the five sections.

Also note that the sections within the ANSI standard are referenced where applicable. *This document is meant to summarize the key points within the standard, but not act as a substitute for it. It is recommended the ANSI Z358.1 be consulted directly for further detail.*

Requirements for all Emergency Equipment

Tepid Water (Sections 4.5.6, 5.4.6, 6.4.6, 7.4.5, 8.1.1.2, 8.2.3.4)

Throughout the ANSI Z358.1-2004 standard tepid flushing fluid is considered necessary in all types of emergency equipment applications. In Appendix B6 of the standard, the specific temperature range of tepid water is noted. Generally, temperatures higher than 100-degrees Fahrenheit may cause chemical interactions with the skin and result in further damage. At 60-degrees Fahrenheit and below hypothermia becomes a concern. Consulting a safety/ health advisor will be a helpful aid in the determination of the best temperature parameters. No two hazards are exactly the same and each should be evaluated on a case-by-case basis.

Manufacturer's Instructions (4.5.1, 4.6.1, 5.4.1, 5.5.1, 6.4.1, 6.5.1, 7.4.1, 7.5.1, 8.1.2.1, 8.1.2.2, 8.2.3.1, 8.2.4.1)

Without proper installation as deemed by the manufacturer, a product may not function as needed in an emergency. Therefore, manufacturers must provide clear instructions regarding installation, operation, and any maintenance issues. These instructions should also be readily available for reference by maintenance and training staff.

Emergency Fixture Location (4.5.2, 5.4.2, 6.4.2, 7.4.2)

Emergency fixtures must take no more than 10 seconds to reach and the path to the fixture must not be hindered with obstructions. Therefore, not only is the location of the fixture critical, but also being sure the area nearby is free of debris or other hazards that may impede its use. Appendix B5 notes the suggested distance of 55 feet as a guideline of what type of area may be covered within 10 seconds.

Also note personal wash units and drench hoses are considered supplemental equipment. Supplemental equipment is only designed to assist other types of emergency products, but can not be the only product available to address an emergency situation. For example, a personal eyewash could be used in conjunction with an eyewash or eye/face wash. It would be best if the personal eyewash is in close proximity to a worker's area for immediate treatment. However, they would then proceed to the nearest eyewash or eye/face wash fixture for the full 15-minute flush required by the ANSI standard.

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Signs and Lighting (4.5.3, 5.4.3, 6.4.3, 7.4.3, 8.2.3.2)

In an emergency situation one's vision may be impaired. Therefore, emergency equipment requires what ANSI describes as a "highly visible sign." This signage must be in close proximity to the emergency equipment for quick identification. Adequate lighting must also be provided in the area surrounding emergency equipment.

Training (4.6.4, 5.5.4, 6.5.4, 7.5.4, 8.1.2.3, 8.2.4.3)

Employees must be made aware of the location and operation of emergency equipment. Even the best emergency products won't be able to serve their purpose if employees are unaware of where they are or how to use them.

Health/ Safety Advisor (4.5.6, 5.4.6, 6.4.6, 7.4.5, 8.1.1.2, 8.2.3.4)

Tepid water covers a range from 60 to 100-degrees Fahrenheit within Appendix B6 in the ANSI standard. Determining the best temperature within this range should be carefully assessed for each application. A Safety/Health advisor is the designated professional that can offer feedback regarding the best temperature.

Annual Inspections (4.6.5, 5.5.5, 6.5.5, 7.5.5, 8.1.2.4)

Emergency fixtures could be tampered with or accidentally damaged. Each year emergency products must be inspected to ensure they still meet the compliance requirements per the ANSI standard. While a fixture may be certified to meet the ANSI standard, once installed, its important to make sure all necessary requirements of the standard are still being met.

Requirements by Emergency Equipment Product Category

Plumbed and Self-Contained Emergency Showers (Section 4)

Emergency shower equipment must be constructed of materials resistant to corrosion (Section 4.1.3). The flushing fluid it delivers must be at a flow that is non-injurious to the user (Section 4.1.1) and protected from airborne contaminants (Section 4.1.3).

Critical Dimensions

- 82" -96" from the showerhead to the surface the user stands (Section 4.1.2)
- Sprayhead pattern must have a 20" by the time the flushing fluid is 60" above the surface the user stands (Section 4.1.5)
- Center of the sprayhead pattern should be 16" from obstructions (Section 4.1.5)
- 69" maximum height from where the user stands to the valve (Section 4.2)

Performance and Maintenance Criteria

- Minimum Flushing fluid of 20 GPM at 30 PSI for 15 minutes (Section 4.1.4)
- Valve should easily activate in a second or less and remain open on its own until it is intentionally turned off (Section 4.2)
- If the potential for freezing conditions, product specifically designed to avoid freezing should be utilized (Section 4.5.5)
- Plumbed units should be activated long enough to be sure flushing fluid is provided. On a weekly basis (Section 4.6.2)
- Self-contained units should be visually inspected and necessary cleaning or flushing fluid replacement should be determined (Section 4.6.3)

Plumbed and Self- Contained Eyewash Equipment (Section 5)

Emergency eyewash equipment must be constructed of materials resistant to corrosion (Section 5.1.5). The flushing fluid it delivers must be at a flow that is non-injurious to the user (Section 5.1.1) and protected from airborne contaminants (Section 5.1.3).

Critical Dimensions

- 33" -45" from the nozzles to the surface the user stands (Section 5.4.4)
- Nozzles must also be at least 6" away from a wall or any type of obstruction (Section 5.4.4)
- An eyewash gauge should be utilized to assess the flow pattern. See Illustration 3c on page 21 of ANSI Z358.1-2004 for exact dimensions. (Section 4.1.5)

Performance and Maintenance Criteria

- Minimum Flushing fluid of .4 GPM at 30 PSI for 15 minutes (Section 5.1.6)
- Valve should easily activate in a second or less and remain open on its own until it is intentionally turned off (Section 5.2)
- If the potential for freezing conditions, product specifically designed to avoid freezing should be utilized (Section 5.4.5)
- Plumbed units should be activated on a weekly basis long enough to be sure flushing fluid is provided (Section 5.5.2)
- Self-contained units do not require activation, but require a visual inspection to verify adequate flushing fluid is available (Section 5.5.3)

Eye/Face Wash Equipment (Section 6)

Emergency eye/ face wash equipment must be constructed of materials resistant to corrosion (Section 6.1.5). The flushing fluid it delivers must be at a flow that is non-injurious to the user (Section 6.1.1) and protected from airborne contaminants (Section 6.1.3)

Critical Dimensions

- 33" -45" from the nozzles to the surface the user stands (Section 6.4.4)
- Nozzles must also be at least 6" away from a wall or any type of obstruction (Section 6.4.4)
- An eyewash gauge should be utilized to assess the flow pattern. See Illustration 3c on page 21 of ANSI Z358.1-2004 for exact dimensions. (Section 6.1.7)

Performance and Maintenance Criteria

- Minimum Flushing fluid of 3 GPM at 30 PSI for 15 minutes (Section 6.1.6)
- Valve should easily activate in a second or less and remain open on its own until it is intentionally turned off (Section 6.2)
- If the potential for freezing conditions, product specifically designed to avoid freezing should be utilized (Section 6.4.5)
- Plumbed units should be activated long enough on a weekly basis to be sure flushing fluid is provided (Section 6.5.2)
- Self-contained units do not require activation, but require a visual inspection to verify adequate flushing fluid is available (Section 6.5.3)

Combination Units (Section 7)

Showers, eyewashes, eye/face washes, and drench hoses all can be utilized in Combination Units. The requirements of each of these types of product categories must be met when utilized with other categories of emergency equipment (Section 7.1.1, 7.1.2, 7.1.3, 7.1.4)

All the emergency equipment on a Combination Unit must be able to be used simultaneously by the same individual (7.4.4).

Critical Dimensions

- Refer to the shower, eyewash, eye/face wash, and drench hose sections of this document or the ANSI standard for applicable dimensions.

Performance and Maintenance Criteria

- Refer to Sections 4,5,6, and 8.2.2 for valve information (Section 7.2)
- If the potential for freezing conditions, product specifically designed to avoid freezing should be utilized (Section 7.4.4)
- Plumbed units should be activated long enough on a weekly basis to be sure flushing fluid is provided (Section 7.5.2)
- Self-contained units do not require activation, but require a visual inspection to verify the adequate flushing fluid is available (Section 7.5.3)

Supplemental Equipment (Section 8)

Supplemental equipment is intended for immediate use. However, supplemental equipment must be followed up by the usage of emergency product that can provide a minimum of 15 minutes of flushing fluid continuously (Section 8).

Critical Dimensions

- Drench hoses may be used as eye/face washes if they meet the requirements of those types of products (Section 8.2.1)

Performance and Maintenance Criteria

- Expiration dates and instructions must be "permanently affixed" to personal wash products (Section 8.1.1.3)
- If the potential for freezing conditions, product specifically designed to avoid freezing should be utilized (Section 8.2.3.4)

Key Changes Between ANSI Z358.1-1998 and ANSI Z358.1-2004**Drench Hoses - Not Just a Supplement**

The uses for drench hoses have been expanded in the 2004 standard. In the 1998 standard, drench hoses had a minimum flow requirement of 3.0 gpm and were not to be used as replacements for eyewashes or drench showers. Drench hoses were simply to be used to supplement these devices. The 2004 standard eliminates any flow requirement for drench hoses. Although the 2004 version still does not allow drench hoses to replace a drench shower, it does allow these hoses as a replacement for an eyewash or combination eye/face wash - as long as the drench hose meets the appropriate requirements.

Eyewashes and eye/face washes each have separate guidelines within the ANSI standard. An eyewash only flushes your eyes while an eye/face wash flushes one's eyes and face simultaneously. The most notable distinction between these two categories of fixtures relates to the volume of flushing fluid that must be dispensed. Eyewashes must be able to provide flushing fluid at .4 gpm at 30 psi. Eye/face washes must be able to provide flushing fluid at 3.0 gpm at 30 psi. These requirements have not changed from the 1998 to 2004 standards.

Simplified Testing

Details are what can make the difference between complying and falling short of the ANSI standard when testing a product. In the past, ANSI mandated specific testing procedures that ANSI-approved testing agencies must follow to certify a self-contained eyewash as ANSI compliant. The 1998 standard required the following steps:

- Fill the eyewash with flushing fluid and then activate. Record the time needed to fill a gallon container.
- Verify that the water gently flows at .4 gpm at similar heights.
- After 15 minutes of operation, use the water collected to refill the container.
- Activate the unit again. Beginning 12 ½ minutes after the flow, the time it takes to fill the gallon container must be 2 ½ minutes or less.

While the 1998 standard emphasized specific testing procedures, the 2004 standard does not delve into those details. Rather, the 2004 standard notes the 15-minute test must meet the .4 gpm characteristics throughout the testing period. How to best verify that the product meets these requirements is up to the discretion of each ANSI approved testing agency. Only an independent, third-party organization can confirm that a manufacturer's product is certified to the ANSI standard.

Shower Heights and Pressure

The 2004 standard clarifies that drench showerheads should be installed in a height range rather than a set dimension. In both the plumbed and self-contained portions of the ANSI standard, it indicates the distance between where the user stands and the showerhead should be between 82 and 96 inches.

The 1998 standard specified the range of 82 to 96 inches as well. However, the testing procedure in the plumbed portion of the

standard also mentioned a set dimension of 84 inches from the surface the user stands on to the showerhead portion.

Also worth noting in the 2004 standard is a requirement for plumbed showers to have a flushing fluid of 20 gpm at 30 psi. No pressure restriction is designated in the 1998 standard.

Weekly Activation Note

To be sure plumbed units are always in proper operating condition, they should be activated on a weekly basis. ANSI standards from both 1998 and 2004 note this requirement. However, the 2004 revision offers more specific rationale regarding why it is so critical.

Beyond confirming that units work, ANSI offers a couple of reasons for regular activation:

- Sedimentation is cleared, which can clog the supply line.
- Flushing stagnate water from plumbed fixtures reduces the chance of microbial hazards.

Consistent activation makes the difference between meeting minimum requirements for installed products, and having emergency equipment that is truly functional and provides the best performance in the event of an emergency. An inspection tag noting activation attached to each emergency fixture is a helpful tool to facilitate this process. This log may also serve as important documentation upon a plant inspection.

Another minor area of revision for the 2004 standard falls under personal wash units. Personal wash units are those that do not meet the requirements of plumbed or self-contained emergency equipment. They provide immediate flushing prior to the user accessing an ANSI-approved emergency fixture. The verbiage in this section is similar to the 1998 ANSI standard with two modifications. First, the 2004 standard specifies that tepid flushing fluid must be supplied. Second, the scope of emergency fixtures is widened. The 1998 standard only addresses personal *eyewash* equipment.

One final revision includes the expert who should be responsible for determining the best solution for particular emergency applications. A facility safety/health advisor is now indicated as the key contact for water temperature and related issues. These individuals are deemed to be the best consultants, rather than simply "medical advisors" who were mentioned throughout the 1998 standard.

Amended Appendices

While the appendices that follow the ANSI standard are not considered part of the requirements, they are helpful. There are several points that serve as guidelines for addressing issues that fall into gray areas.

First, the ANSI standard requires that emergency showers or eyewashes be accessible within 10 seconds or less of the hazard. Facility managers and others often ask, "How far of a distance is that?" According to the revised appendix, 10 seconds is approximately 55 feet.

Second, doors are a concern since they may hinder a user accessing emergency equipment. According to the 2004 appendix, it's acceptable for one door to separate potential users from emergency

fixtures under certain conditions. However, the door cannot have a lock and it must open in the direction moving towards the shower or eyewash.

Lastly, the temperature range of "tepid" water is mentioned. The ANSI standard states that each application and situation must be evaluated on a case by case basis. However, as a general rule 100-degrees Fahrenheit is probably the highest temperature water, while the lower end should be 60-degrees Fahrenheit. The appendices indicate that temperatures over 100 degrees may intensify chemical burns to the skin and eyes, and hypothermia becomes a concern on the lower end of the scale.

Conclusion

When it comes to keeping your workforce safe, ANSI is regarded as a key resource for safety regulations - standards range from water temperature to shower and eyewash mounting heights. To ensure you are meeting the necessary requirements, review the entire 2004 ANSI standard in detail. Please contact Bradley at 1-800-BRADLEY or visit us at www.bradleycorp.com if you have any questions regarding Bradley's emergency fixtures and how they comply with the ANSI standard.