ThermOmegaTech®

APPLICATION PROFILE #4

WATER SUPPLIES FOR SAFETY SHOWERS & EYEWASH STATIONS

To prevent workplace injuries safety showers and eyewash stations are critical in facilities where personnel can be exposed to hazardous materials and chemicals. Facilities equipped with these stations must be aware of the regulatory requirements and compliance standards to install, operate, and maintain these units. Important factors to address are water supply quality, OSHA and ANSI safety requirements, and the delivery of safe and comfortable water temperatures to employees if a shower/eyewash is activated.

1. **Water Quality:** As a general rule of thumb, if it is safe enough to drink, it is safe enough to shower with. An area of concern is insuring that the water supply is free of any sediment buildup and any bacteria that might have developed in the standing water supply. ANSI standards recommend that all emergency shower/eyewash devices be checked on a ***weekly basis*** to ensure proper working conditions, confirm adequate water supply and to flush any sediment/bacteria out of the system. Many shower manufacturers offer units with pipeline strainers or recommend they be installed on a dedicated water supply line.

2. **Water Capacity:** Plumbed emergency shower/eyewash equipment requires a line size that will provide adequate flow. The chart below shows typical water pressure and supply requirements as specified by ANSI.

Emergency Fixtures	PSIG	GPM (Min.)	Inlet Size
Plumbed Eyewash Stations	30	0.4	1/2″
Plumbed Face/Eyewash Stations	30	3.0	1/2″
Plumbed Drench Showers	30	20	1″ Min.

ANSI Z358.1 is the **American National Standards Institute's standard for Emergency Eyewash and Shower Equipment**. ANSI Z358.1-2014 gives the following performance and installation requirements:

Drench Shower	
Potable Water Delivery	Minimum flow of 20 GPM at 30 PSI for 15 minutes
Water Spray Pattern	20″ minimum diameter - 60″ from standing level
Center of Water Spray	16″ from any obstruction
Control Valve & Actuator	Stay ON type to accommodate for hands-free rinsing. OFF to ON activation in one second or less - easily located
Shower Height	Spray head must be positioned between 82″-96″ from the floor
Pull-rod Height	Pull-rod must be installed no more than 69″ from the floor
Location to Hazard	Maximum 10 seconds travel and within 100 feet of hazard
Identification	Well-lit area with a highly visible safety sign

Eye Wash Station	
Potable Water Delivery	Minimum of 0.4 GPM at 30 PSI for 15 minutes for plumbed and portable eyewash units
Velocity	Soft spent stream to both eyes simultaneously
Control Valve & Actuator	Stay ON type to accommodate for hands-free rinsing. OFF to ON activation in one second or less - easily located
Nozzles	Dust caps or covers must be installed to protect from airborne contaminants
Nozzle Height	Must be positioned between 33"- 45" from the floor. The height of the fluid flow pattern is to be no greater than 53"
Nozzle Location	Positioned at least 6" from the wall or nearest obstruction
Location to Hazard	Maximum 10 seconds travel and within 100 feet of hazard
Identification	Well-lit area with a highly visible safety sign
Eye/Face Wash Station	
Potable Water Delivery	Minimum of 0.3 GPM at 30 PSI for 15 minutes for plumbed and portable eyewash units
Velocity	Soft spent stream to eyes and face simultaneously
Control Valve & Actuator	Stay ON type to accommodate for hands-free rinsing. OFF to ON activation in one second or less - easily located
Nozzles	Dust caps or covers must be installed to protect from airborne contaminants
Nozzle Height	Must be positioned between 33"- 45" from the floor. The height of the fluid flow pattern is to be no greater than 53"
Nozzle Location	Positioned at least 6" from the wall or nearest obstruction
Location to Hazard	Maximum 10 seconds travel and within 100 feet of hazard
Identification	Well-lit area with a highly visible safety sign
Drench Hose	
Potable Water Delivery	Minimum of 3 GPM - low velocity
Location to Hazard	Maximum 10 seconds travel and within 100 feet of hazard
Control Valve	Stay ON type to accommodate for hands-free rinsing. OFF to ON activation in one second or less - easily located
Other Considerations	
Delivered Water Temperature	Tepid water must be supplied - temperatures range of 60°-100°F for a minimum 15 minute irrigation period
Freeze Protection Required	Mechanical or Electrical
Hostile Environment Protection	Enclosure - Heated/Non-Heated
Alarms Required	Local and/or Remote
Modesty Consideration	Does not discourage equipment use
Material Safety Data Sheets	Available on file in safety or medical department
Medical Assistance/ Emergency Vehicle	Available in plant or outside
Inspection	Monthly record should be maintained
Maintenance	Each unit activated weekly to flush line and verify flow
Training	All employees instructed on proper use of equipment

Further clarification is offered for two of the items under "Other Considerations".

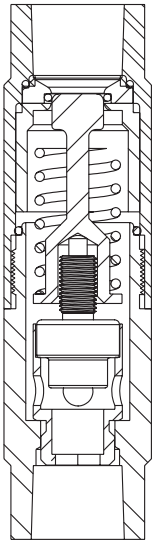
3. **Delivered Water Temperature:** Tepid. In most cases the high temperature condition is of critical concern and a high inspection area for OSHA; however, low temperature hazards are also a growing concern.

a) **Over-temperature/Scald Protection:** Supply lines or shower units installed outside are subject to solar heating with internal water temperatures reaching 150°F (66°C) and above. Likewise, indoor units and lines may be subject to high ambient temperature conditions from process, steam or condensate lines. This over-temperature water must be purged from the system to prevent scalding.

Relationship of Time and Temperature: Studies[1] have demonstrated that there are two critical factors which determine the risk of a burn injury occurring: the temperature of the material and the length of time the skin is exposed to the temperature. For water, the following chart provides time/temperature relationships required to cause a full-thickness (3rd degree) burn.

Temperature °F (°C)	Time	Temperature °F (°C)	Time
120 (49)	9.5 min.	140 (60)	5 sec.
125 (152)	2.0 min.	145 (63)	2.5 sec.
130 (54)	30 sec.	150 (66)	1.8 sec.
135 (57)	15 sec.	158 (70)	1.0 sec.

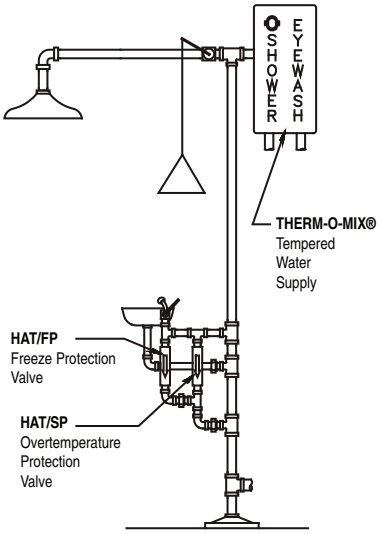
Remember! Normal safety standards dictate a minimum of **15 minutes** wash down in the shower!



A common device used for over-temperature/scald protection by shower manufacturers and retrofitted by users is a self-contained temperature activated valve, such as the ThermOmegaTech® HAT/SP or IC/SP designs.

The internal sensor/actuator operates over a 10°F (5.5°C) temperature differential, with the valve being fully closed at 95°F (35°C) and increasing to full flow if temperature reaches 105°F (40°C) or above. This purges the hot water from the system, to be replaced by the cooler water in the supply line.

Valves are normally installed in the station (see typical piping layout) to insure:
1. Full station and system piping are purged of hot water.
2. Valve discharge will not reduce available flow to shower or eyewash unit.

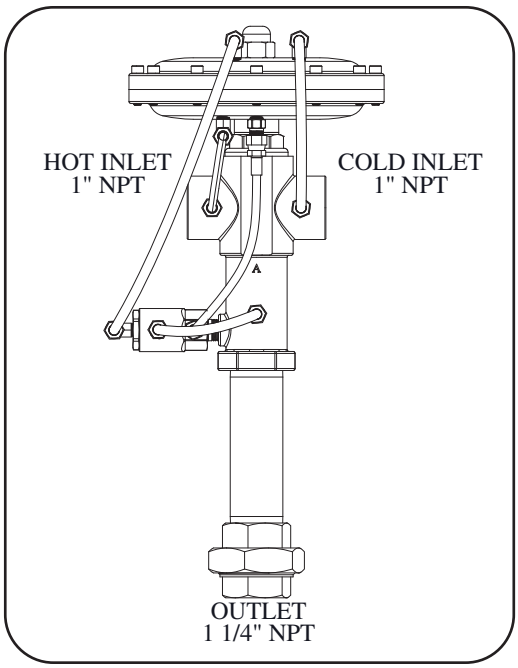


b) **Low Temperature Shock/Hypothermia Protection:** Many facilities are now considering the effects of low water temperature in relationship to the length of time a person will shower, or the combined effects of hypothermia and shock to the victim due to extended exposure to cold water (Remember: 15 minutes or more is required).

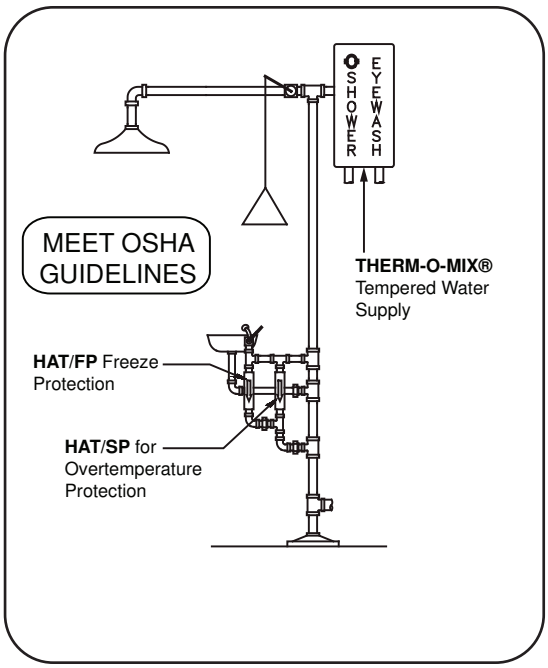
A 1993 case relates that a power plant employee was splashed with a hazardous solution. Following plant safety procedures, he at once went to the nearest shower unit, started a full body shower, and almost immediately jumped out of the shower due to the cold water. Knowing the potential danger from burns, four fellow employees forced him back into the shower, holding him in place for the required 15 minute wash down; by then, he was unconscious and in shock. Many manufacturers are addressing this concern by offering a number of variations of tempered water supply systems. These range in size and design from electric or steam water heaters to hot/cold water mixing assemblies.

1 The above time and temperature relationship chart was developed by a number of studies conducted by: Lewis & Love (1926); Wu, Yung-Chi, N.B.S. (1972); Dr. M.A. Stoll, for U.S. Navy (1979)

In line with the needs within the industry, ThermOmegaTech's **Tempered Water Supply Systems** are available as either a unit that mixes hot and cold water supply like the ***Therm-O-Mix® Station/WWM*** or a unit that utilizes plant steam through a proprietary heat exchanger loop to indirectly heat cold water ***(Therm-O-Mix® Station)***. Both have redundant controls for safety, and are self-contained; no electrical connections are required. The most common temperature requested is about 85°F (29°C); not warm enough to open the skin pores and not too cold to deter usage.



THERM-O-MIX® STATION/WWM
Utilizes hot & cold water mixing to produce tempered water supply.



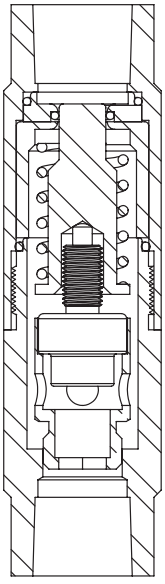
THERM-O-MIX® STATION
Utilizes steam to indirectly heat supply water to produce tempered water supply.

4. **Freeze Protection:** The second item under "Other Considerations" refers to freeze protection, mechanical and/or electrical. Many shower manufacturers offer heavily insulated and electrically heat traced shower designs. In some areas, electrical tracing cannot be used safely (due to explosion hazards), and potential power outages could well result in freeze damage.

   A few manufacturers provide backup freeze protection on traced units by the addition of mechanical freeze protection valves while others (and many users) depend only on freeze protection valves equal to the ThermOmegaTech® HAT/FP and IC/FP designs.

   The HAT/FP, like the HAT/SP scald valve, is a temperature actuated device; in this case, operating over a 35° - 40°F (1.7° - 4.4°C) range to enhance water conservation.

   The valve starts to open when sensing a fluid temperature of 35°F (1.7°C) or less, closing when the resupply water temperature reaches 40°F (4.4°C).



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