



Assets Planning and Delivery Group  
Engineering

## **DESIGN STANDARD DS 79-02**

---

### **Emergency Safety Showers and Eyewash Stations**

---

VERSION 3  
REVISION 0

APRIL 2021

## FOREWORD

Design Standards are prepared to ensure that the Water Corporation's staff, consultants and contractors are informed as to the Water Corporation's design standards and recommended practices. Design standards are intended to promote uniformity so as to simplify design and drafting practice and have as their ultimate objective the provision of safe and functional plant at minimum whole of life cost.

The Water Corporation design standards and recommended practices described in this design standard have evolved over a number of years as a result of design and field experience and these have been investigated and documented.

Deviation, on a particular project, from the design standards and recommended practices may be permitted in special circumstances but only after consultation with and endorsement by the Senior Principal Engineer, Water Treatment in the Water Corporation's Engineering Business Unit.

Users are invited to forward submissions for continuous improvement to the Senior Principal Engineer, Water Treatment who will consider these for incorporation into future revisions.

### Head of Engineering

*This document is prepared without the assumption of a duty of care by the Water Corporation. The document is not intended to be nor should it be relied on as a substitute for professional engineering design expertise or any other professional advice.*

*It is the responsibility of the user to ensure they are using the current version of this document.*

© Copyright – Water Corporation: This standard and software is copyright. With the exception of use permitted by the Copyright Act 1968, no part may be reproduced without the written permission of the Water Corporation.

## **DISCLAIMER**

Water Corporation accepts no liability for any loss or damage that arises from anything in the Standards/Specifications including any loss or damage that may arise due to the errors and omissions of any person. Any person or entity which relies upon the Standards/Specifications from the Water Corporation website does so that their own risk and without any right of recourse to the Water Corporation, including, but not limited to, using the Standards/Specification for works other than for or on behalf of the Water Corporation.

The Water Corporation shall not be responsible, nor liable, to any person or entity for any loss or damage suffered as a consequence of the unlawful use of, or reference to, the Standards/Specifications, including but not limited to the use of any part of the Standards/Specification without first obtaining prior express written permission from the CEO of the Water Corporation.

Any interpretation of anything in the Standards/Specifications that deviates from specific Water Corporation Project requirements must be referred to, and resolved by, reference to and for determination by the Water Corporation's project manager and/or designer for that particular Project.

## **REVISION STATUS**

The revision status of this standard is shown section by section below

<b>REVISION STATUS</b>						
<b>SECT.</b>	<b>VER./REV.</b>	<b>DATE</b>	<b>PAGES REVISED</b>	<b>REVISION DESCRIPTION (Section, Clause, Sub-Clause)</b>	<b>RVWD.</b>	<b>APRV.</b>
<b>1</b>	<b>1/0</b>	<b>30.04.13</b>	<b>All</b>	<b>New Version</b>	<b>SZ</b>	<b>NH</b>
	<b>1/1</b>	<b>30.09.15</b>	<b>5</b>	<b>Reference to S399 included</b>	<b>NH</b>	<b>MH</b>
	<b>2/0</b>	<b>29.03.18</b>	<b>6</b>	<b>Definition of Potable and Service Water added</b>	<b>NH</b>	<b>DH</b>
	<b>3/0</b>	<b>14.04.21</b>	<b>6</b>	<b>Link to S399 changed to DS 79-04</b>	<b>SZ</b>	<b>DH</b>

<b>2</b>	<b>1/0</b>	<b>30.04.13</b>	<b>All</b>	<b>New Version</b>	<b>SZ</b>	<b>NH</b>
	<b>1/1</b>	<b>30.09.15</b>	<b>7</b>	<b>Section 2.9 amended to make green lighting mandatory. Section 2.10 (new) added</b>	<b>NH</b>	<b>MH</b>
	<b>2/0</b>	<b>29.03.18</b>	<b>7-8</b>	<b>Clarifications, particularly in 2.5 and 2.6</b>	<b>NH</b>	<b>DH</b>
	<b>3/0</b>	<b>14.04.21</b>	<b>8&amp;9</b>	<b>Section 2.11 added and link to S399 changed to DS 79-04</b>	<b>SZ</b>	<b>DH</b>

<b>3</b>	<b>2/0</b>	<b>29.03.18</b>	<b>All</b>	<b>New Section</b>	<b>NH</b>	<b>DH</b>

<b>App 1</b>	<b>2/0</b>	<b>29.03.18</b>	<b>All</b>	<b>New Section</b>	<b>NH</b>	<b>DH</b>

# DESIGN STANDARD DS79-02

## Emergency Safety Showers and Eyewash Stations

### CONTENTS

<i>Section</i>	<i>Page</i>
<b>1 Preliminaries.....</b>	<b>6</b>
<b>1.1 Scope.....</b>	<b>6</b>
<b>1.2 Standards.....</b>	<b>6</b>
<b>1.3 Definitions.....</b>	<b>6</b>
1.3.1 Shall.....	6
1.3.2 Should.....	6
1.3.3 Station.....	6
1.3.4 Potable Water.....	6
1.3.5 Service Water.....	6
<b>2 Station Features.....</b>	<b>7</b>
<b>2.1 Description.....</b>	<b>7</b>
<b>2.2 Materials of Construction.....</b>	<b>7</b>
<b>2.3 Shower Design.....</b>	<b>7</b>
<b>2.4 Eye and Eye/Face Wash Design.....</b>	<b>7</b>
<b>2.5 Temperature Protection.....</b>	<b>7</b>
<b>2.6 Safety Shower Activation Alarming.....</b>	<b>8</b>
<b>2.7 Location of Stations.....</b>	<b>8</b>
<b>2.8 Signage.....</b>	<b>8</b>
<b>2.9 Lighting.....</b>	<b>9</b>
<b>2.10 Pressure Test Point.....</b>	<b>9</b>
<b>2.11 Water Supply Risk and Alarms.....</b>	<b>9</b>
<b>3 No Potable Water Supply Main Situations.....</b>	<b>9</b>
<b>3.1 Potable Water Supply Concept.....</b>	<b>9</b>
<b>3.2 Design Criteria.....</b>	<b>11</b>
<b>3.3 Control &amp; Alarms.....</b>	<b>11</b>
<b>APPENDIX 1: OPERATIONAL INFORMATION – Hand-dosing of Safety Shower Water Supply Tank with Sodium Hypochlorite.....</b>	<b>12</b>

# 1 Preliminaries

## 1.1 Scope

This Design Standard outlines the critical design criteria required by the Water Corporation and Australian Standards for Emergency Safety Showers and Eyewash Stations. It also addresses situations where a potable water supply main to site is not available.

## 1.2 Standards

This Design Standard makes reference (directly or indirectly) to the following current Australian and Water Corporation Standards. There may be other relevant Australian Standards depending on the nature of the facility being designed:

### AS/NZS

2927 The storage and handling of liquefied chlorine gas

3780 The storage and handling of corrosive substances

4775 Emergency eyewash and shower equipment.

### Water Corporation

[DS 79-04 Signage, Labelling and Markers](#)

## 1.3 Definitions

### 1.3.1 Shall

Indicates the statement is mandatory, and thus must be carried out.

### 1.3.2 Should

Indicates the statement is a recommendation.

### 1.3.3 Station

Means a Safety Shower combined with either an Eye OR Eye/Face wash unit.

### 1.3.4 Potable Water

Water suitable for drinking; referred to as Drinking Water in AS4775.

### 1.3.5 Service Water

Water not specifically provided for drinking, but, is used for operational/maintenance purposes and likely to come into contact with personnel.

## **2 Station Features**

### **2.1 Description**

Stations are used by personnel to either drench affected areas of skin which have been subject to contamination by a dangerous chemical or to rinse their eyes of foreign materials or hazardous liquids. Stations shall consist of a safety shower with either a single eyewash unit OR a combination eye/face wash unit.

### **2.2 Materials of Construction**

In accordance with AS4775 section 5.1, the stations shall be constructed from materials that are compatible with the chemical environment that they may be subject to and which minimises ongoing maintenance requirements. Stainless steel 316 shall be used unless otherwise approved. All plastics used shall be UV resistant.

### **2.3 Shower Design**

The shower component shall activate via a freestanding pull down stainless steel triangular or circular pendant and be fitted with a stay open valve. Thus, once the shower is triggered it will continue providing a continuous flow of water until the handle is pushed back to its original position. Shower performance shall be in accordance with AS4775, including when the eye or eye/face wash is being operated simultaneously.

### **2.4 Eye and Eye/Face Wash Design**

This component shall be designed to allow activation via a foot pedal or hand plate and provide a fast cleansing, low velocity first aid curtain of aerated water that washes both the eye and face contours gently. Harsh streams or jets, that may embed chemical materials into the eyes or skin, shall be avoided. The aerator nozzles shall be protected from direct heat and insects with a UV resistant plastic shield or caps. Performance shall be in accordance with either eye OR eye/face wash requirements of AS4775, including when the shower is being operated simultaneously.

### **2.5 Temperature Protection**

All pipework shall be lagged with a suitable insulating material in order to reduce heating of the water.

In localities subject to high ambient temperatures, or for stations with a northerly facing and exposed to sunlight, a thermostatic relief valve, set at an appropriate temperature, shall be included in the pipework in order to prevent personnel from being scalded. The thermostatic relief shall be designed and positioned to minimise the unswept volume of hot water within the station piping when the thermostatic relief is open (i.e. the relief point and supply points should be located so as to promote flow through and minimise dead sections of heated up water) and to direct the released water away from the concrete floor pad (algal growth can occur on floor pads otherwise, creating slip a hazard). The relief valve setting shall be 37°C opening and 35°C closing.

## 2.6 Safety Shower Activation Alarming

In areas subject to significant incidences of vandalism, or that are remote and therefore require workers to adopt “Lone Worker” procedures, consideration shall be given to include a flow switch in the pipe-work, which will detect if the station has been left turned on and provide a digital output to a local PLC. The flow switch alarm generated by the PLC shall, however, include at least a 2 minute delay\* initiation to permit personnel visiting the site to test the station without triggering the alarm.

In addition to the flow switch, a “panic” button can also be considered for use if required by the region. In this case, activation of either device will generate the “Safety Shower Activated” alarm.

\***Note:** The delay may have to be extended to accommodate the thermostatic relief valve if provided.

## 2.7 Location of Stations

Stations shall be located in accordance with relevant Australian Standards (e.g. AS2927, AS3780, AS1940) and take into account the work locations of personnel. Stations shall be located at the same level of the hazard where the hazardous operations are to take place, in accordance with clause 6.6 of AS 4775. Precise positioning of the station shall reflect the logical escape route(s) that personnel would be inclined to take and the likely sources of hazard.

## 2.8 Signage

Facilities serviced by stations shall be provided with “Safety First” signage, in accordance with Water Corporation signage standard [DS 79-04 – Signage, Labelling and Markers](#), to remind personnel to perform a test of the station before entering a chemical area:

**[TEST SAFETY SHOWER “PRIOR TO ENTRY” SIGN \(DS WCSS350\)](#)**

**[TEST SAFETY SHOWER “PRIOR TO WORK” SIGN \(DS WCSS354\)](#)**

Where a station is not readily visible from the area where hazardous operations occur, then directional signage shall be provided in accordance with Water Corporation Signage Standards to allow personnel to readily locate the Station:

**[EMERGENCY SHOWER DIRECTION SIGN \(DS WCSS307\)](#)**

All stations shall have the safety shower and eyewash emergency information sign located near the unit:

**[EMERGENCY SHOWER & EYEWASH SIGN \(DS WCSS306\)](#)**



## 2.9 Lighting

Stations shall be provided with a fluorescent light, which shall have a green tube to allow ready identification, and location. Consideration shall be given, however, to the implications of providing lighting to areas with a hazardous area classification due to the presence of flammable gases or liquids.

With respect to activation of such lighting, an automated system should be used if feasible - which might take the form of an interlock with a light sensor, deactivation of site security, etc.

## 2.10 Pressure Test Point

A tee, isolation valve and threaded connection shall be provided to allow connection of a pressure test gauge and checking of the stations water pressure. The connection shall be a 15mm (½ inch) BSP fitting which typically suits the gauges used by Water Corporation (some gauges may require a 3/8 inch reducer, but, this will be addressed by Water Corporation).

## 2.11 Water Supply Risk and Alarms

There have been several risks identified whereby the flow and/or pressure needs of emergency safety shower and eyewash stations could potentially become unavailable and leave personnel exposed to injury or harm.

To address these risks a low-pressure alarm indicator shall be fitted that will alert personnel via an audible and visual alarm.

Pumps that supply emergency safety shower and eyewash stations shall include a fault alarm in addition to the low-pressure alarm.

Emergency safety shower and eyewash stations are subject to a mandatory test before commencing work on a chemical system. The inclusion of these alarms will assist with detecting anomalies in the system before work commences and potentially leaving personnel exposed.

## 3 No Potable Water Supply Main Situations

Where no potable water supply main is available to a site, then the following concept shall be implemented in order to satisfy the drinking water requirements of AS4775, unless approved otherwise by the Senior Principal Engineer Water Treatment. Sites being retrofitted may require modifications to the concept, but, shall also be approved by the Senior Principal Engineer Water Treatment.

### 3.1 Potable Water Supply Concept

The station water supply shall consist of the following elements:

- A 3 to 5kL polyethylene or GRP tank installed outdoors on a concrete slab with a platform
  - The choice of tank volume is dependent upon the number of stations that need to be tested and the number of sinks and hose reels that will be in use.
  - The tank shall be light coloured to minimise heat uptake
  - The tank shall comply with AS 4020 (Testing of products for use in contact with drinking water), 2070 (Plastic materials for food contact use) & 4766 (Polyethylene storage tanks for water and chemicals)
  - The tank shall be supplied with potable water, with tanker supply being the norm,
  - The chlorine residual will be manually maintained by hand dosing small volumes of sodium hypochlorite solution at a determined frequency

- The tank feeds a water pump which provides pressurised supply to station(s), sink(s) and hose reels(s).
- The tank shall be provided with;
  - A DN50 UPVC inlet (male camlocks with dust cover)
  - A DN40 UPVC outlet
  - A DN80 UPVC overflow
  - A DN50 UPVC scour
  - A DN300 inspection/dosing hatch with inbuilt vent
  - A DN25 UPVC recirculation inlet
  - A tank level visual indicator – clear PE tube with UPVC fittings at each end
  - A tank level alarm (by level switch connected to SCADA)
- A concrete slab for the tank
  - The dimensions will be dependent upon the tank width and volume, but, the minimum slab thickness shall be 150mm.
  - An assessment shall be made of the impact of ground conditions
- A platform with steps shall be provided if the tank height is greater than 1.2m
  - The platform height should not exceed 2m above ground level unless absolutely necessary
  - If the platform height does exceed 2m, then guard railing shall be provided.
  - The platform standing area shall be between 1.0 and 1.2m below the top of the tank
  - The platform shall have a minimum area of 1m<sup>2</sup>
  - The platform shall be designed in accordance with AS1657
- A water pressure booster package incorporating:
  - A booster pump
  - A pressure tank with pressure instrumentation (to start & stop the pump)
- A Reduced Pressure Zone Device (RPZD) that is installed on the line that feeds the hose reel (i.e. service water applications).

There are two recirculation options that shall be selected from:

1. Recirculation from water pressure booster package discharge via a motorised valve, incorporating:
  - A motorised valve
  - Controller and timer (operable from SCADA)
  - DN25 UPVC pipework
2. Recirculation using a separate recirculation pump, incorporating:
  - A separate recirculation pump
  - Controller and timer (operable from SCADA)
  - DN25 UPVC pipework

The concept shall comply with standard design drawing JD71-60-99-01.

## 3.2 Design Criteria

The design of the system is determined by the requirements of AS4775, which requires a supply pressure of 210kPa delivering a flow of 88.6 L/min (for a minimum of 15 minutes) of water to the combined safety shower and eye/facewash (~1400L). An allowance of 1000L is provided for the routine testing of a single station and for hose reel and sink use. Allowing an additional 600L for delays in re-filling and unusable volume gives a tank minimum capacity of 3000L.

## 3.3 Control & Alarms

The control concept for the system shall be as follows:

- The water pressure booster package shall incorporate a controller that starts and stops the pump automatically to maintain system pressure within the range required by AS4775.
- The booster pump shall be independently controlled and have dry run protection. The pump shall be interlocked with the tank low low level switch.
- The tank shall be equipped with a low level switch to alert operators to the need to arrange for tank re-fill.
- A recirculation pump or motorised valve shall be provided to enable mixing of the sodium hypochlorite that has been manually dosed into the tank.
- A auto/manual/off local hand switch shall be provided to control operation of the recirc pump or motorised valve:
  - When the selector is set to Auto, the PLC automatically operates the pump or valve based on Time Interval and Duration set points.
  - When the selector is set to Manual, the pump or valve will immediately operate and not cease recirculation until the controller is set to Auto or Off.
  - When the selector is set to Off, the pump or valve will cease recirculation.
  - The pump or valve will have a Fault alarm.
- A local control shall be provided to adjust the recirculation interval
- A local control shall be provided to adjust the recirculation duration
- A pump or valve fault alarm shall be provided on SCADA

## **APPENDIX 1: OPERATIONAL INFORMATION – Hand-dosing of Safety Shower Water Supply Tank with Sodium Hypochlorite**

Hand dosing is to be undertaken using a handheld container. Due to the small amounts of sodium hypochlorite expected to be needed, the use of low concentration solution (e.g. 1-4%) is feasible, provided that it is of suitable quality (i.e. does not contain any significant contaminants such as colourings or fragrances).

As the potable water being delivered to site will have a background residual already, the “top-up” amount of hypo required to achieve the target residual is in fact very minimal. It can be calculated using the following tool: [Tank dosing calculation hypochlorite](#)

**END OF DOCUMENT**