



Assets Planning and Delivery Group
Engineering

Design Standard DS70-03

Emergency Shut Off Devices for Use on Chlorine Containers Standard

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FOREWORD

Chlorine 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 in the Water Corporation's Engineering Business Unit.

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

Head of Engineering

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REVISION STATUS

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

REVISION STATUS						
SECT.	VER./REV.	DATE	PAGES REVISED	REVISION DESCRIPTION (Section, Clause, Sub-Clause)	RVWD.	APRV.
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1	1/2	30.07.04	All	Reformatted, Sect numbering changed from letters to numerals	NH	NW
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2	1/6	07.03.23	7	S2.1 Delay time altered to 10s to reflect actual equipment capabilities.	NH	BM
2	1/6	07.03.23	8	S2.6 Air supply removed	NH	BM
2	1/6	07.03.23	8	S2.7 &2.8 – requirement for hard-wiring made more explicit	NH	BM

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1 Preliminaries

1.1 Scope

The scope of this Design Standard consists of the design factors required by the Water Corporation for the effective use of Chlorine emergency shut off devices.

1.2 Standards

This Design Standard makes reference to the following current Standards:

AS/NZS

2927 The storage and handling of liquefied chlorine gas (esp: clause 7.8.6)

3000 Electrical Installations (known as the Australian/New Zealand Wiring Rules)

1.3 Definitions

1.3.1 Chlorine

Elemental chlorine in its gaseous or liquid form.

1.3.2 Container

A vessel used for transporting liquefied chlorine. Containers come in 33kg and 70kg cylinders, and 920kg drums.

1.3.3 ESD

Emergency Shutoff Device. AS2927 refers to them as automatic shutoff devices.

ESD's are units consisting of an actuator that directly acts on the chlorine container valve to close it.

1.3.4 Shall

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

1.3.5 Should

Indicates the statement is a recommendation.

2 Design Factors

2.1 System Configuration

Water Corporation's current philosophy is that ESDs shall be installed at all chlorine facilities.

All chlorine containers that are configured for use (ie are in duty or standby with their valves open) shall be fitted with an ESD. All ESDs shall operate to close the container valves when either the designated chlorine concentration (5ppm) is detected for at least 10 seconds (set in leak detector controller or ESD controller). An alternative option is for ESD activation to be by remote activation if approved by the Senior Principal Engineer - Water Treatment.

2.2 Description

There are two major types of emergency shutoff devices: electrically actuated and pneumatically actuated. Only electrically actuated ESDs shall be installed at Water Corporation sites – existing pneumatic units will continue operation until replaced by a corporate project.

Only ESDs that have been approved for use by Water Corporation shall be used. Currently the approved ESD systems are:

1. the Halogen Terminator actuator
2. the Westwater Chlorshield system.

2.3 Actuator Design

The actuator shall be designed to allow an operator to readily operate the chlorine vessel valve (e.g. quick release of actuator or some method to operate the valve (spindle) whilst the actuator is in place).

2.4 Control Panel Design

The controller shall be provided in the switchroom although retrofits may be installed in the storeroom. In either situation, an IP65 (minimum) plastic case with compression cable glands shall be provided to provide protection against a possible chlorine environment that may arise due to a gas leak. Each control panel shall have:

- (a) indicator lights to display the status of key system elements;
- (b) the capability to accept signals from sources such as gas detectors, emergency pushbutton(s) and/or remote station alarms to initiate an emergency shutdown by closure of the chlorine container valves;
- (c) a manual pushbutton or switch located clearly on the front of the control panel that initiates an immediate emergency shutdown by closure of the chlorine container valves.

2.5 Power Supply (electrically actuated ESDs)

The power supplied to the emergency shutoff system shall be either connected to an uninterruptible power supply (UPS) or equipped with a battery backup and charger. The UPS/battery shall be configured such that it can be disconnected from the system (e.g. power interruption, isolated etc.) without initiating an emergency shutdown operation of the system. For systems that use a battery, a clear procedure for battery replacement shall be provided in the O&M manual that does not result in initiation of an emergency shutdown.

The UPS/battery shall be able to run the system for a minimum of 4 hours for metropolitan facilities or 8 hours for country facilities after the loss of power. A low battery voltage shall initiate an emergency shutdown and external alarm to the chlorine PLC.

2.6 Switches and Buttons

The control panel shall have the following switches/buttons provided:

- (a) A test switch that will activate the shut down process. This can be used for maintenance testing to ensure the system continues to function correctly.
- (b) A reset switch that will reset the unit for normal operation.
- (c) A panic button to allow for an operator-initiated closure.

For chlorine modules, this is unlikely to be used by an operator in the event of an emergency so a remote panic button may be requested in the control room.

For large chlorine buildings, a remote panic button may be requested to be located next to an exit door, but, inside the room.

The switches and buttons shall be weatherproof and include high quality LED indicators.

2.7 Interface with Chlorine Leak Detectors

The emergency shutoff system shall be capable of operating using a hard-wired 5ppm chlorine leak detected alarm relay output signal from the Water Corporation's preferred chlorine leak detectors.

2.8 Inputs/Shutdown Initiators

The unit shall shut down if any of the following occur:

- (a) Test switch is pressed.
- (b) Remote shut down command (including SCADA or panic button) is activated.
- (c) Chlorine leak detection (5ppm) signal is generated (hard-wired signal directly from leak detector controller).

2.9 Outputs

The unit shall provide a suitably rated output for connection to the chlorine PLC that indicates activation of the emergency shutdown device.

If the unit is equipped with a separate low battery voltage alarm output then this shall also be connected to the chlorine PLC and provide an alarm to the Operations Centre.

END OF DOCUMENT