Assets Planning and Delivery Group
Engineering

DESIGN STANDARD DS 70-02

Chlorine Leak Detectors Standard

VERSION 1
REVISION 6

JUNE 2026

FOREWORD

The intent of Design Standards is to specify requirements that assure effective design and delivery of fit for purpose Water Corporation infrastructure assets for best whole-of-life value with least risk to Corporation service standards and safety. Design standards are also intended to promote uniformity of approach by asset designers, drafters and constructors to the design, construction, commissioning and delivery of water infrastructure and to the compatibility of new infrastructure with existing like infrastructure.

Design Standards draw on the asset design, management and field operational experience gained and documented by the Corporation and by the water industry generally over time. They are intended for application by Corporation staff, designers, constructors and land developers to the planning, design, construction and commissioning of Corporation infrastructure including water services provided by land developers for takeover by the Corporation.

Nothing in this Design Standard diminishes the responsibility of designers and constructors for applying the requirements of the Western Australia's Work Health and Safety (General) Regulations 2022 to the delivery of Corporation assets. Information on these statutory requirements may be viewed at the following web site location:

Overview of Western Australia's Work Health and Safety (General) Regulations 2022 - WorkSafe – LGIRS

Enquiries relating to the technical content of a Design Standard should be directed to the Senior Principal Engineer - Water Treatment, Engineering. Future Design Standard changes, if any, will be issued to registered Design Standard users as and when published.

Head of Engineering

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REVISION STATUS

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

REVISION STATUS						
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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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4	1/2	30.07.04	All	Included in this standard, Reformatted. Section numbering changed from letters to numerals	NH	NW
	1/3	28.02.17	7-9	Section renumbered as Sec3 and significantly revised.	NH	DH

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DESIGN STANDARD DS 70-02

Chlorine Leak Detector Standard

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1 Preliminaries

1.1 Scope

The scope of this Design Standard is to list the key design features required by the Water Corporation for Chlorine Leak Detectors and to outline the reasoning behind those decisions (the latter is shown in italics). Chlorine leak detectors shall comply with this Design Standard.

1.2 Standards

This Design Standard refers to the following current Standards:

AS2927 The storage and handling of liquefied chlorine gas

1.3 Definitions

1.3.1 Chlorine

Elemental chlorine in its gaseous or liquid form.

1.3.2 Container

The vessel in which the chlorine is wholly or partly contained, including cylinders and drums.

1.3.3 Cylinder

A rigid packaging, which is designed in accordance with AS 2030.1 as a portable pressure vessel for storage of chlorine, and has only one cylinder valve, at the top, used for the withdrawal of chlorine gas.

1.3.4 Chlorine Store

An area that is used solely for the storage of chlorine containers and their associated equipment.

1.3.5 Drum

A cylindrical steel container having a water capacity of 500-1000 L and which can be fitted into a protective cradle for storage and transport.

1.3.6 Installation

All of those facilities on a site that are related to the storage, handling and use of chlorine.

1.3.7 Shall

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

1.3.8 Should or May

Indicates the statement is a recommendation.

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2 Mandatory Design Features

2.1 Leak Detection Range

Leak detectors shall be ranged in accordance with section 3.2 and provide an analog output of 4-20mA representing the measurement range.

2.2 Alarm Settings

At least two adjustable alarm outputs (via voltage free contacts) shall be available. For 0-20ppm range sensors, the values shall be able to be set at 1ppm and 5ppm alarm with an accuracy of +/- 10% of value. Alarms shall be configurable as normal/failsafe and latching/non-latching.

Note: The 5ppm alarm output is required to be hardwired to an emergency shutoff device control panel in addition to connection to the chlorine PLC.

2.3 Remote Reset Capability

Leak detectors and leak alarms shall be capable of being remotely reset via a digital input in accordance with DS40.

It should be noted that this will not impact the operation of Emergency Shutdown devices that are activated by the 5ppm alarm and which have to be reset locally (physically).

2.4 Uninterruptible Power Supply (UPS)

Leak detectors shall be supported by the onsite UPS.

Water Corporation experience in remote locations is that power supply can be subject to frequent disruption or spiking. As a result, leak detectors shall be designed to not generate false alarms in the event of power spikes.

2.5 Sensor Interferences

Leak detector cell sensors shall be designed such that they are not activated by smoke or other atmospheric constituents.

2.6 Unit display and Local Reset

Leak detectors shall include a digital display that indicates the active sensor(s) and their current chlorine reading. A reset switch or pushbutton shall also be provided.

2.7 Testing

Leak detectors shall be capable of undertaking daily self-testing of electronics and the detector cell(s) in a manner that satisfies the requirements of Clause 7.8.1.3 of AS2927.

A digital output shall be provided to allow telemetering of a “Leak Detector Fail” alarm.

The self-test capability should be designed to allow manual initiation or time driven initiation.

2.8 Enclosure Rating

Receiver module enclosures shall be rated to IP65 in order to reduce damage by any chlorine leakage to electronic circuitry. Equipment shall be rated to operate within specification over an ambient range of 0 to 50ºC and 0-99% non-condensing.

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2.9 Communications Protocols

Chlorine Leak Detection equipment shall have either Hart or Profibus capability.

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3 Chlorine Leak Detector Philosophy

3.1 Application

This section details the requirements and considerations involved in the location and alarming of chlorine leak detectors and should be read in conjunction with AS2927. Its purpose is to highlight Water Corporation specific requirements over and above AS2927.

3.2 Location of Chlorine Leak Detectors and Alarm Limits

Chlorine installations shall be designed for leak detection in both the chlorine store and chlorination rooms (and solution room if the ejectors are in a dedicated wet room or pump room). Two detector cells are required as a minimum in the chlorine store room. A third detector cell shall be provided for very large containment buildings.

The first chlorine leak detector cell (and third cell where provided) shall be ranged for 0 to 20ppm and have alarm levels of 1ppm, 5ppm and 20ppm (the latter usually being derived from the analogue output of the cell). The second cell in the store room that shall be ranged 0 to 100ppm, but, will have alarm levels of 5ppm and 20ppm (the latter again usually being derived from the analogue output of the cell). It should be noted that 100ppm has been chosen as the maximum range for the second cell to ensure that the 5ppm gas concentration can accurately be measured, thereby allowing for redundant detection.

The 1ppm alarm setting is intended as a local advisory alarm – i.e. to warn personnel when chlorine has exceeded the OSH exposure limit at ground level.

The 5ppm alarm setting is intended as a general warning and investigation alarm – i.e. to warn personnel that hazardous levels of chlorine are present. Control and interlocking arrangements are detailed in the EO28 chlorine standard design drawings and DS70-20, DS70-25 and DS70-30 Functional Control Specifications.

The 20ppm alarm setting is intended as an emergency/incident alarm – i.e. to warn personnel that a potentially significant incident may have occurred.

The 100ppm range analogue data is intended to be used by incident response personnel to determine the potential severity of a leak.

It should be noted leak detector cells will undergo saturation at high gas concentrations, with low range sensors being affected quicker. 100ppm sensors potentially allow incident managers more time to assess the gas concentration data when they are determining incident response actions.

The control unit of the leak detector should be housed in the electrical/control room where possible. Location in the chlorine store is not permitted. Location in the chlorinator room is permitted although should be avoided as damage from fugitive emissions can occur.

3.3 Interlocking with Ventilation Fans

Ventilation fans shall be interlocked with the 5ppm alarm signal from a chlorine leak detector such that their operation is inhibited during a chlorine leak

At “Containment Sites” (see DS70-01), fans shall also be equipped with an onsite alarm after 55 minutes of continuous operation and a 60-minute automatic shutdown interlock and off-site alarm in accordance with Water Corporation standard design drawings.

Where a project specifies the requirement for a fan inhibit over-ride to be provided (to permit operation of fans when the gas concentration is greater than 5ppm), the over-ride shall be implemented using an over-ride screen on the chlorine HMI which allows a run time to be entered by the operator – run-time shall be limited to 5 minutes maximum. *This feature will only be used with the approval of an Incident Manager*.

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