

Engineering Standard I-SPE-STD-017 Monochloramine and Free Ammonia Analyser

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This document is the property of Seqwater. It must not be copied or reproduced in any way whatsoever without the authority of Seqwater. This document is uncontrolled when printed. An electronic database manages and stores the controlled version.

1. Purpose

This document is part of a suite of Seqwater Engineering Standards which are in alignment with the Seqwater Quality Management System. Their purpose is to provide a consistent approach to the development, modification, and management of Seqwater infrastructure that is fit for purpose, economic over the life of the asset, and meets Seqwater's risk appetite and compliance requirements including Work Health and Safety obligations.

This Standard Specification provides the minimum requirements and recommendations for Monochloramine and Free Ammonia analysers.

This Standard Specification is not intended to cover:

- Dosing systems and sample lines
- Supply and discharge tanks, pipes, valves, and nozzles
- Bunding
- Electronic Control system/s
- Gauges, displays or instrumentation that are not specifically detailed herein

This document must be used in conjunction with the documents it references to assist in ensuring fit for purpose infrastructure. This Standard Specification is not intended to be relied on solely for design, supply, and installation works; advice from specialist engineers and/or manufacturers may be required on a case-by-case basis.

2. Scope

This Standard Specification applies to all Seqwater employees, contractors, suppliers and consultants working for or on behalf of Seqwater unless otherwise stated. It applies to all new assets and to all existing assets undergoing refurbishment or modification. It must be used in conjunction with other relevant Seqwater Engineering Standards and project specific documents to define the technical requirements for infrastructure design and construction.

Where single or discrete components of an existing non-compliant system are to be replaced, refurbished or modified, this standard should not automatically be applied to the entire system retrospectively, however consideration should be given, in consultation with relevant stakeholders, to the extent of the application of the standard outside of the components requiring replacement, refurbishment or modification, to ensure safe, economic, and fit for purpose infrastructure.

Seqwater Engineering Standards include Standard Specifications, Drawings, Procedures, Templates, Forms and Preferred Equipment Lists. Together they detail Seqwater's minimum requirements and recommendations to provide infrastructure that will be fit for purpose, safe, and cost effective to operate and maintain. However, compliance with these requirements and recommendations does not remove, and cannot be relied on as meeting, the designer's overarching responsibility for ensuring infrastructure designed is fit for purpose and safe to construct, operate, maintain, and demolish. The designer must exercise appropriate due diligence to identify and manage hazards so far as is reasonably practicable.

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Designers must also ensure compliance with relevant Australian Legislation, Standards, Codes and Guidelines (including those produced by Water Services Association of Australia). Where no Australian Standard exists for a particular application, work must conform to the most current version of an industry accepted international standard.

Deviation from meeting the minimum requirements in this Standard Specification requires written agreement from Seqwater as per the deviation process detailed in Procedure X-PRO-STD-008 Asset Standards Management and Application. That process includes completion of an X-TMP-STD-022 Asset Standards Deviation Request Form together with relevant supporting documentation, and submission by the Seqwater Project Representative to the Seqwater Engineering Mailbox. Where noted in this Standard Specification that Seqwater approval, agreement, or acceptance shall/must be sought, such approval, agreement or acceptance must be gained through the Seqwater Asset Standard Deviation process, as outlined above.

Responsibility for ensuring compliance with Seqwater Engineering Standards lies with those engaged in the management and execution of design, construction, and modification of Seqwater infrastructure. This includes modifications to the functional design of the infrastructure including technical changes made which would extend an asset outside of its design operating envelope and/or approved operation and maintenance practices.

Any ambiguities or conflicts identified between specific requirements within this Standard and project documents, another Seqwater Engineering Standard or Australian Legislation, Standards, Codes or Guidelines, must be brought to the attention of the Seqwater Document Owner as listed in the document footer, via the Engineering Mailbox, for clarification. Where it is proposed to proceed without meeting the requirements of this standard, agreement must be obtained via the Deviation Process, as outlined above.

Seqwater undertakes regular updates of its Engineering Standards. Before utilising this Engineering Standard the complete list of Seqwater Engineering Standards should be reviewed to ensure currency and applicability of standards to be applied to the works. These can be accessed on the Waternet [Seqwater Engineering Standards & Framework](#) page or from your Seqwater project manager, design manager, or engaging officer.

3. Technical Requirements

3.1. General Analyser Requirements

This Standard Specification provides guidance on standard operating and physical requirements of the monochloramine and free ammonia analyser only. For the purpose of this Standard Specification, the battery limits are:

- The sample line connection into the analyser
- The sample line connection out of the analyser
- The waste connection out of the analyser
- The reagent/buffer solution, if any, supply line, and sample waste connection out of the analyser.

The monochloramine and free ammonia analyser may be a single or multi-channel analyser suitable for measuring monochloramine and free ammonia concentration in treated water compliant with the Australian Drinking Water Guidelines. The measurement of total chlorine and total ammonia is also preferred, but optional.

The analyser shall be made up of components commonly used for the application and represent current water industry best practice.

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Spare parts that may reasonably require replacement, probes, pump components, and reagent/buffer solution shall be readily available in Australia and supported for a minimum period of the design life of the analyser. Lead time for the delivery of spare parts to a nominated Seqwater site will be a maximum of three working days after receipt of order.

All components and ancillary equipment shall be designed to withstand washdown with a handheld, mains pressure water hose.

Refer to **I-SPE-STD-015 Instrumentation** Standard Specification for general requirements related to instrument assets.

3.2. Design Life

The minimum design life of the monochloramine and free ammonia analyser shall be 10 years unless otherwise specified or approved by Seqwater. It is understood that some components of the analyser, as specified in the manufacturers' preventative maintenance schedule, require regular replacement. These components do not discount the asset life.

3.3. Design Reliability and Availability Target

Each analyser should achieve:

- MTBF of at least 8760 hours; and
- Availability of at least 99.9% - where the downtime calculation includes breakdown maintenance but excludes scheduled preventive maintenance; and
- Availability of at least 99% - where the downtime calculation includes breakdown maintenance and scheduled preventive maintenance.

3.4. Operating Conditions

All components of the analyser must be suitable for the design, maximum flow, pressure, temperature, duty cycle and other operating conditions. They must have compatibility with treated water with all wetted components designed using corrosion and wear resistant materials suitable to achieve the specified design life without the need for replacement.

All components must be suitable for operating within the South East Queensland environment, including exposure to potential liquid or gaseous chemicals used within a treatment plant. At a minimum, the analyser must be capable of operating in an open, fully exposed environment with ambient operating temperatures of -5 to +50°C and relative humidity of 10 to 100%. Any external installations will include a sunshade or hard roof over the analyser to minimise direct sun exposure.

A minimum of C3-Medium corrosivity category (as per AS 4312), will apply for all operating environments. A C4-high or C5-very high corrosivity category may be assigned on a case-by-case basis dependant on the installation location.

The analyser will be required to operate continuously, 24 hours per day, 7 days a week under the defined operating conditions.

Analysers must be designed to restart automatically or to be remotely started after a power supply interruption without the need for operator intervention.

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3.5. Safety in Design

Seqwater's expectations relating to safety in design are outlined in the Safety in Design section of X-PRO-STD-009.

All equipment must be designed to perform its intended duty safely and without being attended. Health and safety risks shall be reduced as far as reasonably practicable during the design phase.

Where the analyser is being installed in a Classified Hazardous area, it must comply with the Hazardous Area requirements of **E-SPE-STD-001 Electrical Design and Construction** Standard Specification, and the Hazard Management section of **M-SPE-STD-001 General Mechanical** Standard Specification.

3.6. Drinking Water Compatibility

The waste stream produced by the analyser must be suitable to be returned to process stream without adversely impacting drinking water quality. No impurity in the waste stream shall impart to the process stream more than 10 percent of the health or aesthetic guideline values in the Australian Drinking Water Guidelines (ADWG). For impurities where ADWG values don't exist, the hierarchy of national and international guideline values documents listed in the ADWG will be applied, with the most recent final version of these documents being consulted. Where multiple analysers of the same type are used, their overall impact on drinking water quality must also be taken into account, as per the previously mentioned criteria to the satisfaction of the Principal.

The supplier shall disclose the composition and required volume of reagents, consumables and cleaning products used by the analyser at the time of tender, or at any point in the future if changes are made.

The supplier shall disclose the composition and wetted surface area of material in contact with water, reagents, consumables and cleaning products used by the analyser at the time of tender, or at any point in the future if changes are made.

All components of the analyser and associated plumbing that will be in contact with sample water, must be certified to comply with AS/NZS 4020 by an accredited laboratory within the previous 5.25 years. Components that have certification to recognised overseas standards, such as ANSI/NSF 61 or BS 6920, or recognised approvals such as by WRAS (Water Regulations Advisory Scheme, UK), TZW (Technologie Zentrum Wasser, Germany) or ACS (Attestation de Conformite Sanitaire, France) may also be considered subject to Principal approval via the standards deviation process. Where a recognised drinking water compatibility certification/approval cannot be provided, the supplier must provide details of the analyser materials, wetted surface areas, and quality system certification (e.g. ISO 9001), sufficient to demonstrate that the components which make up the analyser do not adversely impact drinking water quality, subject to Principal approval via the standards deviation process.

3.7. Operating Requirements

3.7.1. Monochloramine Analyser

The analyser shall be suitable for the determination of monochloramine concentration in treated water and total chlorine concentration, as an option, with the following requirements:

- sample water temperature range of 1 to 35 °C.
- accuracy of 0.05 mg/L or +/- 5% of the range, whichever is greater
- +/- 2% repeatability
- 0.05 – 5 mg/L measurement range mandatory; 0.05 – 10 mg/L measurement range preferred
- 0.01 mg/L resolution

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- < 10 minutes T90 response time mandatory; <5 minutes T90 response time preferred
- automatic self-calibrating to a certified reference
- automatic pH and temperature compensation (not required for a reagent type instrument).
- automatic cleaning and zero adjustment
- continuous or batch process, online operation

3.7.2. Free Ammonia Analyser

The analyser shall be suitable for the determination of free ammonia concentration in treated water and total ammonia concentration, as an option, with the following requirements:

- sample water temperature range of 1 to 35 °C.
- accuracy of 0.01 mg/L or +/- 5% of the range, whichever is greater
- +/- 3% repeatability
- 0.02 – 1 mg/L measurement range mandatory; 0.02 – 2 mg/L measurement range preferred
- 0.01 mg/L resolution
- < 10 minutes T90 response time mandatory; <5 minutes T90 response time preferred
- calibration to a certified reference
- automatic sample colour and turbidity compensation
- automatic pH and temperature compensation (not required for a reagent type instrument).
- automatic cleaning and zero adjustment
- continuous or batch process, online operation

3.8. General Analyser Requirements

It is preferred that the monochloramine and free ammonia analyser be combined into one unit for process and cost efficiency.

The flow rate, pressure and temperature of the sample water must be supplied to the analyser within the manufacturer's specification.

The analyser shall have a back lit, 4-digit (minimum) display incorporating a real time clock, selectable English language and multiple selectable display units, including mg/L.

Programming of the analyser operational parameters shall be available through a front panel keypad. The analyser may additionally include the capability for programming parameters via a laptop connection, in which case the required software and any required proprietary connection cables/hardware shall be supplied with the analyser. The analyser shall include a security feature to prevent unauthorized tampering with calibration and configuration settings.

The analyser shall include a data logger, capable of storing and displaying up to 300 events. These events must include, date, time and concentration data, and should include temperature data if available.

3.9. Monitoring and Control Interface Requirements

The analyser must support a hardwired (digital and analogue) continuous monitoring and control interface with the facility's control system.

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The analyser shall have 4–20 mA analogue outputs. Outputs shall be fully scalable and independently assignable to monochloramine and free ammonia. Total chlorine, total ammonia, pH, and temperature should also be assignable if available as analyser functions.

The analyser shall have alarm relay outputs, fully programmable for logic, high, low, high-high and low-low setpoint alarms. Relay outputs shall be configurable to change state when the reagent is low, calibration is due or the analyser detects a fault with the sensor or itself.

(Note: Whilst the alarm relay outputs must be fully programmable, the concentration setpoint alarm limits will usually be set in the site monitoring and control system, using the analyser analogue concentration output.)

The analyser may include an additional wired communications interface. However, this interface can only be utilised if (i) the analyser supports remote write protection, (also called read-only or parameter locking), and (ii) the communications protocol is supported by the site monitoring and control system, and (iii) the communications interface meets the requirement of **I-SPE-STD-013 Control Systems Design and Construction** Standard Specification.

In all cases, the use of a communications protocol shall not replace the minimum hardwired monitoring and control signals described within Remote Monitoring and Remote Control sections below:

Remote Monitoring

- Monochloramine concentration (Analogue)
- Free ammonia concentration (Analogue)
- Analyser Running (Digital)
- Analyser Fault alarm (Digital)
- Local Isolator or SPO closed - auxiliary contact separate from analyser relay outputs (Digital)

If the analyser is fitted with a local control interface, then the following additional signal is required:

- Remote Control Selected (Digital)

Remote Control

All analysers must support the following hardwired signal interface:

- Remote Run (Digital)
- Remote Stop (Digital – optional)
- Remote Reset (Digital)

The facility control system can emit both maintained and pulsed commands. A maintained command is held for as long as the effect is required. e.g. if the equipment is sent a maintained run command, it will operate for as long as the run signal is held.

A pulse command triggers a change in state. e.g. if the equipment receives a pulsed run command, it will continue to run until it receives a subsequent stop command.

Which type of command signal is used depends on the interface supported by the analyser. Where both are supported, maintained commands are preferred.

3.10. Electrical Requirements

The equipment must comply with the requirements of AS/NZS 3000 and **E-SPE-STD-001 Electrical Design and Construction** Standard Specification.

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The equipment shall operate on 230 VAC single phase supply without the need for an external transformer to modify the input supply power; or on a 24 VDC supply.

The analyser shall be certified by the manufacturer or supplier (and preferably an independent test laboratory) as compliant with AS 61010.1 or similar safety standard accepted by Seqwater.

The analyser shall be certified by the manufacturer or supplier (and preferably an independent test laboratory) as compliant with IEC 61326-1 or appropriate EMC standard accepted by Seqwater.

3.11. Protective Coatings

Any protective coating shall be suitable to achieve the design life (refer Section 6.2), without the need for reapplication. Refer to Section 3.4 for the expected operating environment, including minimum corrosivity category.

3.12. Labelling

In addition to the manufacturers name plate, labelling must be in accordance with the Labelling and Nameplate section of **M-SPE-STD-001 General Mechanical** Standard Specification, **X-PRO-STD-006 Asset and Equipment Identifier Procedure**.

Equipment Field Labelling will be added when the analyser is installed.

4. Definitions and Abbreviations

Table 1 Definitions

Term	Definitions
Analyser	Monochloramine and Free Ammonia analyser
Contractor	An entity engaged by Seqwater to undertake work in accordance with an agreed contract and defined scope of work.
EMC	Electromagnetic Compatibility
Employees	Means persons employed directly by Seqwater in a permanent, temporary or casual capacity.
Fit for purpose	Suitable for the intended purpose and meets the performance requirements set out in this standard and other project documents.
Leader	Means any Level 1, 2, 3 and 4 Leader with responsibility for managing a functional area of the business, including people management responsibilities within their functional area.
Manufacturer / Supplier / Vendor / Original Equipment Manufacturer (OEM)	The entity that manufacturers or supplies equipment to meet the specifications of the Contractor.
MTBF	Mean Time Between Failures
Owner / Principal / Seqwater	The entity that engages the Contractor to undertake the work and takes custody of the outcome. The Owner may delegate responsibilities to other entities to act on its behalf (e.g. a consultant).

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Term	Definitions
REX	Seqwater Electronic Document and Records Management System.
Seqwater Approval / Acceptance	Written sign-off gained via the deviation process, as detailed in X-PRO-STD-008 Asset Standards Management and Application Procedure.
Seqwater Engineering Standard	Includes Standard Procedures and Standard Specifications and associated supporting documents such as Standard Drawings, Guidelines, Lists, Datasheets, Manuals, Registers, and Templates.
shall / must	Indicates a mandatory requirement.
should	Indicates a recommendation.
Worker(s)	Includes all permanent, temporary, and casual employees of Seqwater, and: • vocational and work experience placements • volunteers • contractors and consultants employed by another entity but temporarily assigned to do work for or on behalf of Seqwater.

5. Roles and Responsibilities

Table 2 Roles and Responsibilities

Role	Responsibility
Leaders	In addition to the responsibilities of a worker, ensure compliance with this Standard Specification by those they lead.
Workers / Employees	Be aware of and comply with this Standard Specification.

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6. References and Related Materials

The documents listed in Table 3 below, and the requirements therein, are relevant to this Standard Specification. In their latest editions, these documents form a part of this document. Note that this is not an exhaustive list of documents relevant to the works.

Seqwater undertakes regular updates of its Engineering Standards. Before utilising this document, the complete list of Seqwater Engineering Standards should be reviewed to ensure currency and applicability for the proposed works.

Table 3 References and Related Material

Description	Location
AS 4312 Atmospheric Corrosivity Zones in Australia	Intertek Inform / Waternet
AS 61010.1 Safety requirements for electrical equipment for measurement, control, and laboratory use – General requirements.	Intertek Inform / Waternet
AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)	Intertek Inform / Waternet
AS/NZS 4020 Testing of materials that contact drinking water	Intertek Inform / Waternet
IEC 61326-1 Electrical equipment for measurement, control, and laboratory use - EMC requirements - Part 1: General requirements	Intertek Inform / Waternet
ISO 80000 Quantities and units	Intertek Inform / Waternet
PRO-01617 Engineering Standard X-PRO-STD-009 Engineering Design, Construction, Operation and Maintenance Procedure	REX
PRO-01874 Engineering Standard X-PRO-STD-004 Development and Review of Asset Standards Procedure	REX
PRO-02190 X-PRO-STD-006 Asset and Equipment Identifier Procedure	REX
REG-01074 Engineering Standard X-LST-STD-001 Seqwater Preferred Equipment Register	REX
SPE-00348 Engineering Standard M-SPE-STD-004 Protective Coatings	REX
SPE-00352 Engineering Standard E-SPE-STD-001 Electrical Design and Construction	REX
SPE-00353 Engineering Standard I-SPE-STD-015 Instrumentation	REX
SPE-00356 Engineering Standard I-SPE-STD-005 High Priority Alarms and Interlocks Management	REX
SPE-00357 Engineering Standard I-SPE-STD-006 Alarm and Event Management	REX
SPE-00361 Engineering Standard I-SPE-STD-013 Control Systems Design and Construction	REX
SPE-00367 Engineering Standard M-SPE-STD-001 General Mechanical	REX
TEM-00224 Engineering Standard X-TMP-STD-022 Asset Standards Deviation Request Template	REX

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7. Changes from previous version

This Standard Specification will be regularly reviewed in accordance with the requirements of the Seqwater Controlled Document Management Procedure. Reviews will include consideration of suggestions for alteration or improvement made in accordance with Seqwater Procedure X-PRO-STD-004 Development and Review of Asset Standards. Changes made from the previous version are summarised in Table 4 below.

Table 4 Changes from previous version

Section Number	Change
All	Minor formatting updates to latest template.
All	Updated document number reference for Instrumentation Standard Specification, which has been renumbered as I-SPE-STD-015.
Appendix A	Updated preferred equipment from Chemscan UV-2150/S (obsolete model) to Chemscan UV-2250/S (currently available model).

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Appendix A – Preferred Equipment Requirements

Monochloramine and Ammonia in Drinking Water

To establish preferred equipment for online analysis of Monochloramine and Free Ammonia, an EOI procurement process and trial was undertaken in 2017 to 2019 with Tender reference 02769EOI. EOI documents are held in F13/31581/005.

At the time of the preferred equipment selection, Royce Water Technologies was the sole importer and distributor of Chemscan equipment in Australia.

The Chemscan UV-2150/S (2150 now superseded by the 2250) analyser was awarded as the preferred equipment for Free Ammonia and Monochloramine based on its ability to meet measurement, analyser operation and maintenance requirement, and its whole of life cost. The Chemscan unit has also an additional benefit that Total Ammonia and Total Chlorine can also be analysed.

The preferred equipment for online analysis of Monochloramine and Free Ammonia is the Chemscan UV-2250/S. (supersedes the UV-2150/S).

This standard specification (SPE-00432) was updated as Revision 3 in 2026, to include the Chemscan UV-2250/S as the preferred equipment.

The changes between UV-2150/S and UV-2250/S are minor and focus on the HMI panel, which is a more robust and contemporary design. There is no change to the fundamental technical performance against this specification and hence the preferred equipment was directly updated, without repeating the tender process.

Secondary Monitor for Total Chlorine in Drinking Water

Chemscan UV-2250/S analyser can measure Total Chlorine; however, it is not the preferred equipment for primary online Total Chlorine monitoring. Chemscan UV-2250/S may be used for secondary Total Chlorine monitoring, checking or backup for a primary Total Chlorine analyser.

Seqwater Requirements for supply of Chemscan UV-2250/S analyser

Further to the requirements for Monochloramine and Free Ammonia Analysers in the main body of this specification, the following requirements apply to supply of Chemscan UV-2250/S analysers:

1. The water and waste connections and associated pipework arrangements including pressures and flow rates for connecting the inlet water sample stream and outlet waste stream for this equipment must conform to the requirements specified by the manufacturer.
2. The supplied analyser shall have certification to AS61010.1 or equivalent.
3. The supplied analyser shall include 4-20 mA analogue output terminal blocks as part of the Customer Interface Module (CIM). The CIM shall also allow for configurable relay outputs.
4. Upper Compartment 230VAC/24AC transformer and Power Supply SPD 1-24-100T screw terminals shall have IP2X covering shrouds to prevent any inadvertent contact when the cabinet is open for testing or inspection.

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5. Upper Cabinet door labelling shall be 10 mm high white text on red background, engraved ABS plastic with labelling as follows:
 - a. Top section of Upper Cabinet door: "230V SECTION"
 - b. Lower Section of Upper Cabinet door: "DANGER 230V ISOLATE ELSEWHERE BEFORE OPENING"
6. Upper Cabinet door shall have a standard electrical switchboard lock, L&F 92268
7. Lower compartment shall be supplied with splash proof shrouding covering any of the electrical terminals near or adjacent the reagent bottles.
8. Lower Cabinet door labelling shall be 10 mm high black text on white background, engraved ABS plastic stating "24VDC/24VAC CONTROLS AND CHEMICAL REAGENTS SECTION"

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