SA Water

Engineering

Technical Standard

TS 0105 – Quality requirements

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Documents superseded by this standard

The 'quality requirements' section in the following documents is superseded by TS 0105:

a. Technical Standard TS 0420 (sections 3.3, 5.7, 5.10, 5.11 under section 4) – Welding requirements (metal).

b. Technical Standard TS 0460 (section 2.6) – Liners and floating covers for earth bank storages for potable or recycled water.

c. Technical Standard TS 0600 (section 4) – Water tightness testing of liquid retaining structures.

d. Technical Standard TS 0711.0 (section 6) – Concrete remedial works: general requirements.

e. Technical Standard TS 0730 (section 4) – Stainless steel durability, fabrication and erection.

Significant/major changes incorporated in this edition

This is the first version of this Technical Standard.

Document controls

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Approvers

Approver Name	Approver Role	Signature
Matthew Davis	Manager Engineering Quality and Innovation	20/08/2024 X  Signed by: DA003681
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Reviewers

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Raj Ramachandran	Manager Engineering Delivery	1.0	31-07-2024

Contents

1 Introduction

SA Water is responsible for the construction, commissioning and operation of an extensive amount of engineering infrastructure.

This standard has been developed to assist the implementation of quality management in the construction and commissioning of SA Water infrastructure to ensure that it is safe and functional.

1.1 Purpose

The purpose of this standard is to define the minimum quality requirements for Constructors and Suppliers of products and services engaged by or on behalf of SA Water by the Constructors, to ensure that assets are constructed and maintained to consistent quality standards and attain the required asset life.

The Constructor shall be responsible for ensuring that all quality assurance activities necessary to validate the works completed under the Contract are met. This shall include communicating SA Water's Project Requirements to all applicable sub-contractors, Suppliers or other parties engaged by the Constructor.

1.2 Glossary

The following glossary items are used in this document:

Term	Description
DAFI	Developer Agreement Formal Instrument
ITP	Inspection and Test Plan
NATA	National Association of Testing Authorities
NCR	Non-Conformance Report
QA	Quality Assurance
QMS	Quality Management System
SA Water	South Australian Water Corporation
TDRF	Technical Dispensation Request Form
TG	SA Water Technical Guideline
TS	SA Water Technical Standard
WHS	Work Health and Safety
WMS	Work Method Statement

1.3 References

1.3.1 Australian and international

The following table identifies Australian and International standards and other similar documents referenced in this document:

Reference	Title
AS/NZS ISO 9001	Quality management systems – requirements
AS1100	Technical drawings

1.3.2 SA Water documents

The following table identifies the SA Water standards and other similar documents referenced in this document:

Reference	Title
-	Technical Dispensation Request Procedure
TS 0101	Safety in design standard
TS 0104	Design Quality Management
TS 0420	Welding requirements (metal)

1.4 Definitions

The following definitions are applicable to this document:

Term	Description
Accepted	Determined to be satisfactory by SA Water's Representative.
Accredited Superintendent	Authorised under a DAFI agreement to support an effective quality assurance process during construction of infrastructure to be transferred to SA Water by proactively managing risk and working with Constructors to ensure delivery of infrastructure that satisfies SA Water's requirements
Constructor	The organisation responsible for constructing and installing infrastructure for SA Water whether it be a third party under contract to SA Water or an in-house entity.
Contract	A set of documents supplied to Constructor as the basis for construction; these documents contain contract forms, contract conditions, specifications, drawings, addenda, and contract changes.
Designer	The organisation responsible for designing infrastructure for SA Water, whether it be a third party under contract to SA Water, a Constructor, or an in-house entity. A Designer is a person who effects design, produces designs or undertakes design activities as defined in the *Work Health and Safety Act 2012 (SA)*.
Fabricator	The organisation engaged by SA Water or Constructor to carry out welding/fabrication and or erection activities on/for SA Water infrastructure.
Inspection	Measuring, testing or examining Works, materials, goods or services (including raw materials, components and intermediate assemblies) for determining conformity with the Requirements. Measuring, testing or examining Works, materials, goods or services (including raw materials, components and intermediate assemblies) for determining conformity with the Requirements.
Inspection and Test Plans	The planned inspections and tests for individual work processes or activities.
Lot	A discrete area of Work under the Contract consisting of a continuous portion of homogenous and/or representative service, material or construction process produced under essentially constant conditions.
Manufacturer	A person, group, or company that owns and operates a manufacturing facility that provides materials for use in SA Water infrastructure.
Non-Conformance Report	Report provided to SA Water by the Constructor for non-conforming works, which identifies a root cause, corrective actions and measures to prevent a recurrence along with supporting information.
Practical Completion	The Works are complete except for minor omissions and defects that do not prevent the Works from being reasonable capable of use for their intended purpose. Requirements to achieve Practical Completion are as defined in the Contract or DAFI.

Term	Description
Quality Plan	A document which directs personnel about specific quality practices, management responsibility, resources, controls and checks to be implemented to complete the Work under the Contract
Representative	The Representative shall be either one of the following: a. For projects delivered under a Developer Agreement Formal Instrument (DAFI), this shall be the Accredited Superintendent. i. Where witness or hold points on-site are required under this standard, SA Water's Representative shall also be provided with notice to attend at their discretion. b. For projects delivered directly for SA Water under a Contract or engagement, this shall be SA Water's Representative.
Requirement	Need or expectation that is stated within the Contract.
Responsible Discipline Lead	The engineering discipline expert identified in the 'Approvers' table (via SA Water's Representative).
SA Water Project Requirements	Documentation (e.g., Request for Quotation, Functional Specification etc.) specifying SA Water's requirements for a given project, and inclusive of SA Water's Technical Governance.
SA Water Representative	The SA Water representative with delegated authority under a Contract or engagement, including (as applicable): a. Superintendent's Representative (e.g. AS 4300 and AS 2124 etc.) b. SA Water Project Manager. c. SA Water nominated contact person.
Shall and Should	In this Standard the word "shall" indicates a requirement that is to be adopted in order to comply with the Standard. The word "should" indicates practices which are advised or recommended.
Supplier	A person, group or company that provides goods for use in SA Water infrastructure.
Technical Dispensation Request Form	This form is part of SA Water's Technical Dispensation Request Procedure, which details the process by which those required to comply, or ensure compliance, with SA Water's technical requirements may seek dispensation from those requirements.
Terminology	a. Where an obligation is given, and it is not stated who is to undertake these obligations, they are to be undertaken by the Constructor. b. Directions, instructions and the like, whether or not they include the expression "the Constructor shall" or equivalent, shall be directions to the Constructor unless otherwise specifically stated. c. Where a submission, request, proposal is required, and it is not stated who the recipient should be, it is to be provided to SA Water's Representative for review. d. Each word imparting the plural shall be construed as if the said word were preceded by the word "all". e. Each word implying persons shall, where appropriate, also be construed as including corporations. f. "Authorised", "approval", "approved", "selected", "directed" and similar words shall be construed as referring to the authorisation, approval, selection or direction of SA Water's Representative in writing. g. "Allow" shall mean that the cost of the item referred to is the responsibility of the Constructor. h. "Provide" shall mean "supply and install". i. "Submit" shall mean "submit to the SA Water Representative or their nominated delegate". j. Submissions, requests, proposals are to be provided at least ten (10) business days prior to work commencing or material ordering (unless noted otherwise). k. "Informative" shall mean "provided for information and guidance".

Term	Description
Tolerance	The required degree of accuracy. The amount by which a measurement or calculation might change and still be acceptable. In this document Accuracy and Tolerance can be interchangeable.
Traceability	Ability to follow the history, application, design, installation, testing and final location of an object within completed Works.
Work	Elements of a project which require design and/or construction.

2 Scope

2.1 Scope and application of this Technical Standard

This Technical Standard specifies the quality management system requirements for the supply, construction, testing and commissioning activities undertaken on site in the delivery of SA Water infrastructure projects.

It is applicable where cited, whether that be in SA Water's Project Requirements, or in other SA Water Technical Governance.

2.2 Works not in scope

This Standard is not applicable:

a. The supply of all procured materials and equipment that are fabricated, manufactured, assembled, examined, and tested by a Supplier in accordance with their own quality management systems within their own manufacturing plant/site.

   i. If a Supplier is citing ISO 9001 certification however, details of the QA process implement shall be made available to the SA Water Representative upon request.

b. Design quality management, which is specified in TS 0104.

It shall be noted that the provision of item a) above does not absolve a Supplier or Constructor from satisfying any requirement specified in SA Water's Project Requirements, or rectifying such issues where they arise.

2.3 Technical dispensation

Departure from any requirement of this Technical Standard shall require the submission of a Technical Dispensation Request Form (TDRF) for the review and approval (or otherwise) of the SA Water Principal Engineer on a case-by-case basis.

The Designer shall not proceed to document/incorporate the non-conforming work before the Principal Engineer has approved of the proposed action in writing via the Technical Dispensation Request Form (TDRF).

SA Water requires sufficient information to assess dispensation requests and their potential impact. The onus is, therefore, on the proponent to justify dispensation request submissions and provide suitable evidence to support them.

Works that are carried out without being appropriately sanctioned by SA Water shall be liable to rejection by SA Water and retrospective rectification by the Designer/Constructor.

3 Quality requirements

3.1 Quality management system

a. The Constructor shall establish, implement, maintain and audit a Quality Management System (QMS) in accordance with AS/NZS ISO 9001.

a. The Constructor and its major sub-constructors and suppliers shall, from the commencement of the Contract until the date of Practical Completion, establish, file and maintain quality records that demonstrate implementation of the Constructor's QMS for inspection by SA Water's Representative.

b. Evidence of the Constructor's/Supplier's QMS shall be included in the Quality Plan and constitute a **WITNESS POINT.**

c. The Constructor may elect to use an electronic QMS for the storage, retrieval and management of quality records (rather than by hard copy).

d. The Constructor shall include details of the electronic QMS in the Quality Plan.

e. Where the Constructor proposes to use an electronic QMS, it shall provide full access to SA Water to the extent as necessary for SA Water to undertake audit responsibilities.

f. The Constructor shall provide training to SA Water on the electronic QMS.

g. The Constructor shall provide the quality management records in .pdf format.

Confirmation of QMS certification in accordance with ISO 9001 shall be provided to the Representative and constitutes a **HOLD POINT** under this Technical Standard.

3.2 Quality system audits

Internal audits in accordance with the requirements of AS/NZS ISO 9001 shall be undertaken by the Constructor to ensure compliance with the QMS. The Representative may also carry out audits of the Constructor's quality system and/or site records by way of review and verification of the Constructor's documentation, quality assurance measures or inspection and testing records.

3.2.1 Audit schedule

An internal audit schedule for the Contract shall be included in the Quality Plan covering the following types of audit:

a. Audits on the operation of the QMS, to evaluate its effectiveness as applied to the Contract.

b. Audits of work process controls, to evaluate how effectively work process controls are implemented in practice.

c. Product or service audits, to assess conformity of the product or service.

d. Such audits should also extend to the sub-Constructors and suppliers engaged on the Contract, including concrete pre-casters, steel fabricators, concrete suppliers and quarries.

3.2.2 Adjustment to audit schedule

The internal audit schedule shall be adjusted when:

a. Results of previous audits indicate the need for a higher (or lower) audit frequency.

b. Significant changes are made to functional areas of the Constructor's/Supplier's organisation.

c. Safety or other regulatory requirements are in jeopardy, or anticipated to be in jeopardy, due to deficiencies in Constructor's/Supplier's QMS.

d. It is necessary to verify that the required corrective action has been taken.

e. Changes are made to the Constructor's/Supplier's contract program.

3.3 Responsibility

The Constructor's management will demonstrate leadership and commitment to the QMS in accordance with AS/NZS ISO 9001.

3.3.1 SA Water's responsibility

SA Water owes no duty to the Constructor to review any quality documentation submitted by the Constructor for compliance with Legislation, the Contract or Contract Requirements.

SA Water owes no duty to the Constructor to review, measure, test or examine the project, materials, goods or services for non-compliance to the Requirements or detect any defect or error in the Constructor's work at a Witness Point or Hold Point or during surveillance or audit.

3.3.2 Constructor's responsibility

The Constructor's QMS does not negate any Requirement or responsibility specified within Legislation, the Contract or Contract Requirements.

The Constructor will not be relieved from any of its obligations, responsibilities or liabilities under the Contract or any applicable legislation by:

a. The implementation and compliance with any part of the Constructor's QMS.

b. The acceptance or approval (or non-acceptance or non-approval) of any part of the Constructor's Quality Plan by any person authorised under the Contract to approve or accept work under the Contract.

c. Acceptance of the Constructor's disposition for non-conforming products.

d. Compliance with any Witness Point or Hold Point processes.

e. The failure by any person to detect any defect or error in the Constructor's work or documentation at a Witness Point or Hold Point or during surveillance or audit.

The Contract will not proceed beyond a Hold Point without the written approval of the Representative.

SA Water's approval of a Hold Point or endorsement of a Witness Point does not relieve the Constructor of responsibility for satisfactory execution or performance of the work that a Requirement has successfully been achieved.

Where the Representative deems the Witness Point has not successfully achieved the Requirements, may require the Constructor to raise a non-conformance and complete an NCR (refer section 3.10) to facilitate rectification, rework and/or re-submission of the stated activity associated with a Witness Point prior to proceeding beyond the Witness Point.

Where SA Water elects not to inspect a work activity, and the Constructor continues Work beyond a Witness Point without inspection or the endorsement of SA Water:

a. Any such work beyond the Witness Point is entirely at the Constructor's risk.

b. SA Water's decision not to inspect the Work does not constitute an endorsement of work activity associated with the Witness Point.

c. The Constructor shall record evidence of compliance of the work activity to the Requirements.

d. At the Constructor's expense, SA Water may direct the removal, rework or remediation of any work activity that is subsequently deemed to be non-conforming to the requirements.

e. The Constructor indemnifies SA Water against any additional costs that the Constructor incurs as a consequence of proceeding without the endorsement of the Witness Point.

3.3.3 Independent quality control inspector/technical support

Where directed by the Representative (with this direction based on project size, complexity and risk), an approved independent quality control inspector shall be appointed by the Constructor for the project.

The independent quality control inspector shall have defined responsibilities:

a. To ensure that the QMS and Quality Plan are complied with.

b. To witness and monitor operations to ensure that they meet the specified requirements and standards.

c. To inspect, test, or measure materials to the prescribed criteria or standard.

d. To audit the Constructor's quality documentation.

In having an independent quality control inspector, the Constructor is not relieved of its own QA responsibilities.

The independent quality control inspector shall be a professionally qualified engineer or consultant with at least five (5) years relevant experience and hold the following minimum current certifications (or SA Water's Representatives agreed alternative) for the project they are responsible for inspecting:

a. Concrete remedial project: ACA/ACRA Corrosion and Protection of Concrete Structure and Buildings, or equivalent industry or academic corrosion training.

b. Concrete remedial project that include sacrificial or impressed current anodes: NACE/AMPP CP2 or equivalent.

c. Protective coatings: NACE/SSPC/AMPP Concrete Coating Inspector (CCI) Level 2 or equivalent.

The Constructor organisation shall ensure that the Quality Control Inspector shall be available to attend meetings on-site as and when required by SA Water.

The Quality Plan shall include:

a. The relationship between the quality control inspector, corporate management representatives, the project manager and the project team.

b. The qualification and experience of the quality control inspector.

c. The location (if not on-site) and contact details of the quality control inspector.

3.4 Quality plan

The Constructor shall develop, implement and comply with a Quality Plan to direct its personnel about the specific quality practices, management responsibility, resources, controls and checks that have to be implemented to complete the Work under the Contract.

The Constructor shall submit, within ten (10) working days of the Date of Acceptance of Tender, a draft Quality Plan. This document is to include details of the Constructor's proposals for the management and control of quality for the Contract.

HOLD POINT: No work under the Contract shall be undertaken until the submitted Quality Plan has been approved.

A finalised Quality Plan shall be submitted within ten (10) working days of receiving comments from SA Water's Representative.

The Quality Plan shall provide for quality assurance activities on-site and provide for dedicated site quality control resources (that do not undertake the remediation project) to plan, manage and undertake quality control testing of the entire project.

This Quality Plan shall, as a minimum:

a. Information on the Constructor's QMS.

b. Detailed index describing the contents of the Quality Plan.

c. Detailed schedule of the project that includes the schedule for submission of associated Quality Management Documents and the audit schedule proposed for the Constructor's QMS.

d. Information on project-specific resources along with their roles and responsibilities with respect to the QMS.

e. Work Lot identification and register (design and construction).

f. Nominate registers of work method statements, ITPs, hold points, witness points and identified records.

g. Include the recommended inspection and test program that will be used to verify the project.

h. Address specific minimum testing requirements listed in the relevant Technical Standards of SA Water.

i. The proposed method to assure the quality of all suppliers and sub-constructors' products and services.

j. Test results if already available.

    i. SA Water reserves the right to instruct the Constructor to complete additional testing, or to engage an independent testing authority to undertake additional testing at the Constructor's cost if testing is not performed to the SA Water's Representative's satisfaction.

3.5 Quality records

The Constructor shall ensure that all quality records are captured during the execution of the contract and are available, in progress, for review as required by the Superintendent. The Constructor is responsible for control of all documents as required by any legislation. The schedule of quality records is provided in Appendix A2.

All quality records shall be signed by a quality control inspector determined by the Constructor, and a copy shall be submitted to the Representative.

3.5.1 Construction quality records

The following are examples of construction and commissioning quality records:

a. ITPs (refer section 3.8).
b. Soil test results on materials to be used for construction.
c. Compaction density and moisture content tests.
d. Weld test results.
e. Concrete test results.
f. Pipeline pressure tests.
g. Surface preparation and protective coating records.
h. Constructor supplied material data sheets.
i. Daily record of correct depths, width, grade, alignment, and quality of pipes, as well as quality of rings, angle deflection, identification and length of pipe laid.
j. Daily certification by the quality management representative that all work is being carried out to the approved specification and to the agreed Quality Plan.
k. Certification of all employees for WHS, QA, pipe laying and all trades and other activities requiring licensing, certification, registration and/or any other requirements.
l. Change of personnel and sub-contractors.
m. Non-conformance reports as the events occur.
n. All hold points and witness points.
o. Factory acceptance testing records.
p. Commissioning testing records.

3.6 Identification and traceability

The Constructor shall define a system of lot numbering which is practical for the project and which shall be logical, suit the specific application and be consistent with any specified computerised system.

Work under the Contract shall be subdivided into Lots of discrete work areas.

The Constructor shall develop, document (in the Quality Plan), and implement a Lot Management System and a Lot Register which:

a. Enables each Lot to be identified and all work and/or activities shall be able to be readily identified with the relevant Lot.
b. Provides a unique Lot number compatible with any activity numbering in the Contract.
c. Identifies the type of service, material, manufacturing or construction technique.
d. Records measurements/quantities (where appropriate) associated with the Lot.
e. Records the part numbers (and, where appropriate, individual serial numbers) of manufactured items incorporated into the project and allows test results to be positively identified with the lot they represent.
f. Identifies all records associated with the Lot.
g. Records the status of the Lot (including any NCRs).

Weld numbers, if required above, shall be maintained by the Constructor and shall be indicated on "As Built" isometrics or weld maps. For more information on the traceability of welded parts, refer to Technical Standard TS 0420.

All materials (where unique identifier numbers are required) shall have identification numbers transferred to all cut lengths to maintain the traceability of all materials.

Provision of the Lot Register (including monthly status updates) constitutes a **WITNESS POINT**.

The Constructor shall ensure the traceability of materials, work processes and activities to confirm compliance throughout the project's lifecycle.

The Constructor shall divide the project into lots for the purpose of:

a. Positive identification and traceability of all work activities, measurements and tests.
b. Monitoring the quality of products.
c. Submission of work to the Representative via a conformance/nonconformance report.
d. Rejection of work.
e. Submission of dispensation requests for any proposed deviation from a requirement(s).

3.7 Work method statement

The Constructor shall prepare and submit a detailed WMS for all construction processes, which details controls to be exercised to ensure satisfactory achievement of Contract requirements where the absence of such procedures could adversely affect the quality of the work.

Where appropriate, such procedures may be included in the ITPs or other documentation.

HOLD POINT: Work method statements shall be submitted to the Representative at least ten (10) working days before construction of the relevant work commences unless alternative times are specified elsewhere in the Contract.

The work method statement shall include, but is not limited to, the following:

a. Purpose and scope of the activity.
b. Work item or Lot identification.
c. Details of when, where, how and by whom the work will be done.
d. The sequence of operations, in accordance with the construction sequence as nominated in this Technical Standard.
e. Plant, equipment and materials proposed.
f. Detailed requirements applicable to the materials being used.
g. QA (including testing) measures to be implemented per section 3.11.
h. Details of any temporary works associated with the project, including general arrangements, dimensions, and relevant design details and certifications.
i. All matters affecting the safety of the site including control of access to the site, isolations and management of vehicles and other plant.
j. How the activity will be controlled and recorded.

The WMS shall include identification of hazards/risks associated with the project or the site, and corresponding measures to eliminate the hazards. Where the risks cannot be eliminated, risk control and/or management methods shall be specified to reduce them so far as is reasonably practicable. The work method statement and hazard/risk identification shall encompass all site works and temporary works required to facilitate the intended activities.

Construction of the work shall be undertaken in accordance with the submitted work method statement. Any revisions to the accepted WMS shall be submitted to the Representative for review and acceptance with details including, but not limited to, the following:

a. Why the WMS has required alteration.

b. Assessment of any new hazards (whether safety, quality or others) associated with any change to the work method.

c. Actions to be taken to mitigate hazards identified in point b) above.

3.8 Inspection and test plans

The Constructor shall prepare and submit ITPs for all significant construction activities where the absence of such procedures could adversely affect the quality of the work and shall ensure these are kept up to date during the execution of the Works.

ITPs shall explicitly reference acceptance criteria and all performance requirements of the Contract and be prepared by suitably qualified and experienced personnel.

Personnel involved in the preparation of ITPs should include product suppliers, applicators and design engineers as appropriate to the project being undertaken.

Constructors are encouraged to standardise ITPs for commonly encountered work activities or for projects/programs across which the same work activities are repeated.

HOLD POINT: The constructor shall submit ITPs to the Representative not less than ten (10) working days before the work activity commences.

The content of ITPs shall include, but not be limited to, the following:

a. Description of the work activity/sequence of activities.

b. Work item or Lot identification.

c. Location, date and time of the inspection/testing activity.

d. Standard requirements/reference to the applicable clauses of the specification and/or applicable test procedures/methods or Australian Standards used for the testing.

e. Title of the person responsible for activity, verification and acceptance of an ITP item.

f. Witness, hold and surveillance points.

g. Relevant checklists, forms or procedures.

h. Quality assurance activities, including inspection/test type, tolerances or other acceptance criteria.

i. Identification of relevant test procedure/s and quality records.

j. Details of sampling and test equipment to be used for specified tests.

k. Sequence and frequency of inspections/tests.

l. Identification of records (including photographic records) to be maintained of particular tests, inspections and trials.

m. Details of representative samples to be used in order to demonstrate acceptable standards of workmanship for activities where subjective assessment of quality may be required, for example, finishes.

The Constructor shall provide the Representative with one copy of each signed-off ITP (including accompanying records) within five (5) working days of completion of the activity to which the ITP relates.

3.9 Hold points and witness points

3.9.1 Hold points

The minimum required Hold Points are detailed within Appendix A of this Technical Standard. Additional Hold Points may be nominated in other SA Water Technical Governance (refer TG 0103) or at the discretion of the Representative, Designer, Constructor or Fabricator.

Hold Points represent a critical stage of the work that requires release by the Representative before the Work can proceed. The process for Hold Point release is provided below:

a. For Hold Points associated with design or documentation submissions, these shall be submitted to the Representative for release within the nominated timeframes

b. For Hold Points associated with inspections, the Constructor shall submit a request for a Hold Point inspection when work is at such a stage and is ready for inspection. A minimum of 48 hours' notice shall be provided before the hold point is reached:

    i. This request should also contain photographic evidence of the project that:

        - Consists of "jpg" files with a minimum resolution of 4 megapixels.
        - Clearly denotes where the image was taken.
        - Are provided with a time and date stamp.

    ii. Submission of photographic evidence may allow the Hold Point to be released without physical inspection having to occur at the discretion of the Representative.

c. If, after the Hold Point inspection, further work is required prior to proceeding, the Constructor shall submit a request for re-inspection by the Representative prior to written approval being given.

d. Subject to prior approval from SA Water (via a TDRF), the Constructor-nominated quality representative may be authorised to release the project-specific hold points. This is conditional on all records (including photographic evidence) being retained and furnished for later inspection. SA Water also reserves the right to undertake a random audit inspection of the project being delivered.

    i. This provision is **not** applicable in works delivered via a DAFI agreement.

3.9.2 Witness points

The minimum required Witness Points are detailed in Appendix A of this Technical Standard. Additional Witness Points are at the discretion of the Representative, Designer or Constructor.

Witness points represent a point at which compliance of the constructed project with the drawings, WMS, or ITP is to be verified.

The Constructor shall provide a minimum of 24 hours' notice to the Representative of a witness point being reached, with attendance by the Representative to be at their discretion.

3.10 Non-conformance

The requirements of this section apply to non-conformances arising in the construction of SA Water infrastructure. Any non-conformances arising during design activities shall be raised and addressed in accordance with TS 0104.

Where a non-conformance occurs, the Constructor shall:

a. Initiate the non-conformance process of their QMS

b. Promptly notify the Representative and SA Water's Construction Service team, providing the reference number for the non-conformance within the Constructors QMS.

c. Prepare a non-conformance report which shall

   i. Identify and confirms the non-conformance

   ii. Establish the root cause of the non-conformance

   iii. Provide details of actions to correct/resolve the identified non-conformance which have been endorsed by the Designer.

      - These actions shall comply with the relevant SA Water technical requirements.

   iv. Identify actions to prevent a reoccurrence, along with assigning responsibility and a timeframe for their enactment

   e. Confirm when actions from point iv have been completed. The amendments to the quality system to mitigate the recurrence of the non-conformance.

The identification of nonconformity and the subsequent issue of an NCR constitutes a **HOLD POINT** whose release is subject to acceptance of the Constructor's proposed corrective actions.

The Constructor and/or Fabricator shall not proceed to cover up or otherwise incorporate any non-conforming work unless authorised by SA Water in writing via a Technical Dispensation Request Form (TDRF) (which shall be completed in accordance with SA Water's Technical Dispensation Request Procedure).

Works undertaken without being appropriately sanctioned by SA Water may be classed as defective work. Such work or material is liable to rejection by the SA Water Representative, who may require the defective work to be removed and replaced.

3.11 Testing requirements

3.11.1 General

The Constructor shall provide test data that confirms materials being used comply with the requirements of the applicable Technical Standard prior to works being undertaken. All tests shall be undertaken in a NATA-accredited laboratory and submitted to the Representative at least ten (10) working days prior to the project commencing on-site, which represents a **HOLD POINT** under this Technical Standard.

3.11.2 Quality assurance testing

The Constructor shall ensure that the testing required, detailed in either the WMS or ITP, is undertaken in a NATA-accredited laboratory and that the results are:

a. Provided to the SA Water Representative within two (2) working days of receipt.

b. Included in the completed ITP documentation are all test results from Materials Testing.

c. Treat all nominated tests as **WITNESS POINTS** for the SA Water Representative to attend, at their discretion, as per the requirements of section 3.9.

The Constructor shall also aid the Representative (e.g. access, coring, labour etc.) for any tests specifically designated to be performed by the Representative.

3.12 Retesting

If any testing undertaken yields results that do not satisfy the Requirements, the fault shall be detected and rectified. After rectification the Works shall then be retested until a satisfactory test result is obtained. Even if testing produces satisfactory results, any structure or appurtenance that has a visible or detectable leak, blockage, malfunction, or other defect shall be rectified by the Constructor.

3.12.1 Repair procedures

At least ten (10) working days before the commencement of any repair works that may be required, the Constructor shall submit proposed repair methods/materials/modifications, endorsed by the Designer as achieving SA Water's Requirements, to the Representative.

Review and acceptance of repair procedures provided under this section constitutes a **HOLD POINT.**

Provide to the Representative, for monthly site meetings, a summary report listing completed ITPs and the status of all non-compliance reports.

3.13 Permits and certificates

The Constructor shall obtain all necessary permits, site specific inductions, training, certifications and other like consents from SA Water, government and other relevant authorities required to carry out the project and submit copies of all such permits to the Representative.

3.14 Site records

Throughout the progress of the work, the Constructor shall:

a. Keep at least one copy of any standard or other document quoted or referred to in the Contract on-site, to be readily available to personnel for reference purposes.

b. Maintain a complete set of all up-to-date drawings, quality documents and specification(s), together with copies of all variations and additional drawings issued after the date of commencement.

c. Maintain records of any change to working drawings or shop drawings that may have been approved for construction purposes such that on completion of the project, accurate "as constructed" information is available.

The Constructor shall also provide to the Representative, for monthly site meetings, a summary report listing completed ITPs, and a number of/status of all NCRs.

The Representative reserves the right to inspect daily records at any time during the project.

3.15 As-repaired/as-built documentation

Within four weeks of the issue of the Certificate of Practical Completion, the Constructor shall submit a draft as-repaired/as-built report for review by the Representative.

The report shall be in a format acceptable to the Representative for review and acceptance that includes the following records:

a. The lot register that clearly allows the forensic location of a Lot as described in the Contract.

b. Full details of the remedial and construction works undertaken (inclusive of completed ITPs, test results, analyses, reports, measurements, photographic records, drawings, manuals, trial repair reports and all non-conformance reports) for the purpose of recording the repair and construction of the Works.

c. Prepare as-constructed/as-built drawings in accordance with TS 0104.

d. Provide a complete set of any shop drawings, as stated in section 3.16, along with manufacturer product and safety data sheets etc.

e. Warrant that the required repairs have been completed in accordance with the Work Method Statement and Manufacturer's specification/s.

The as-repaired/constructed report shall also include items, as detailed below, for each of the sub-sections of this Technical Standard, including, but not limited to:

a. Drawings:

   i. Record of repair type/material used, including batch information, location and extent on marked up scaled plan and elevation drawings.

   ii. Plan and elevation drawings identifying inspection and test locations.

b. Materials:

   i. Record of materials used, including repair batch information, material product data and materials safety data sheets.

   ii. Material test certificates (as appropriate) that verify claimed material properties.

c. Progress photographs:

   i. Provide colour photographs for the purposes of recording the overall progress of the project and detailing specific aspects of each stage of work, including general views and close-up details.

   ii. Provide appropriate identification markings and/or sub-titles within each photograph to identify specific structural components and the remedial activity.

   iii. Take particular photographs as recommended by the Representative, noting that the Constructor shall be responsible for adequate recording of the project.

   iv. Accurately record the project at no limitation to the number of photos.

   v. Provide one set of photographs (around one set per week) as "jpg" electronic files in logical sub-sets of sufficient quality and quantity to clearly provide a record of the project, with the date taken automatically recorded onto the jpg image.

   vi. Provide a schedule of all photographs including but not limited to filenames, date taken, structural component details and remedial activity.

d. Quality assurance records – Completed tests (including materials, components, Manufacturers' approvals and commissioning) in accordance with the test plan.

e. Inspection and test record sheets – Summary data tables for all quality control testing completed.

f. Certifications:

   i. Provide a legible copy of all warranties, guarantees and certifications.

   ii. Include a summary table that lists all warranties, guarantees and certifications.

Upon the return of reviewed draft documentation by the Representative, the Constructor shall finalise the document and submit final copies comprising two (2) original hard documents and one (1) electronic document. A finalised report shall be submitted within ten (10) working days of receiving comments from the Representative.

3.16 Shop drawings

3.16.1 Scope

All shop drawings shall be in accordance with the relevant parts of the AS 1100 series and shall:

a. Accurately and completely transfer the information from the design drawings.

b. Provide for the development of accurate, detailed dimensional information, which allows for the accurate fit-up of components during erection.

Each shop detail drawing shall be identified utilising a numbering system allowing traceability throughout the duration of the project. Revisions shall be uniquely identified and dated, with the scope of each revision clearly identified.

Where RFIs are issued as part of the process of producing shop detail documentation, a written record of inquiries and responses shall be maintained.

The shop drawings shall show clear and complete information on each assembly, component and connection of the work. The information shall include:

c. Identification.

d. Material type and grade.

e. Dimensions of items.

f. Required camber, where applicable.

g. Fabrication methods including, where applicable, hot- or cold-forming and post-weld heat treatment.

h. Location, type and size of welds or bolts.

i. Weld categories and bolting categories.

j. Orientation of members.

k. Location of temporary connections.

l. Surface preparation methods, pickling and passivation, details to prevent crevices and contact with dissimilar materials.

m. Procedures necessary for shop and site assembly.

n. Lifting and support points for handling and transport.

o. Temporary bracing, if required, for handling and transport.

p. Required fixings for building elements.

q. Procedures for erection, including temporary bracing.

r. Set out of items relative to project grid and rise level.

s. All set-out points as shown on structural and architectural drawings and their dimensions relative to the grid.

t. Particular welding and material testing requirements as nominated by the engineer.

u. Marking plans for all items, including holding down bolts, shear studs and chemical anchors.

3.16.2 Approval of shop drawings

The Constructor shall arrange for shop drawings to be verified by qualified personnel other than those directly involved in the drafting of the shop drawings.

Per TS 0104, shop drawings shall be reviewed and certified by the Designer as complying with project requirements, shall be submitted to the Representative at least ten (10) working days before fabrication commences.

Submission of these documents represents a **WITNESS POINT.**

The Constructor shall be responsible for the correctness of the shop drawings. Submission of the shop drawings to the Representative shall not relieve the Constructor of its responsibilities under the Contract.

Appendix A - Schedules of hold points, witness points, and identified records

A1 Schedule of hold points and witness points

Section	Type	Description
3.1	Hold	Confirmation of QMS certification in accordance with ISO 9001 shall be provided to the SA Water Representative.
3.10	Hold	The identification of Nonconformity and the subsequent issue of a Non-Conformance Report or Corrective Action Request.
3.1	Witness	Evidence of Constructor's/Supplier's QMS in the Quality Plan.
3.11	Hold	Test Data submitted to the SA Water Representative by the constructor at least 10 working days prior to the project commencing on-site.
3.12.1	Hold	Review and acceptance of Repair Procedures
3.11.2	Witness	SA Water Representative to attend, at their discretion all nominated tests.
3.16.2	Witness	Submission of PDF shop drawings, reviewed by the Designer and certified by the Constructor as complying with project requirements, to the SA Water Representative at least ten (10) working days before fabrication commences.
3.4	Hold	No work under the contract shall be undertaken until the submitted Quality Plan is approved.
3.6	Witness	Provision of Lot Register (including monthly status updates).
3.7	Hold	Work Method Statement submitted by the Constructor to SA Water Representative at least 10 working days before construction of relevant work commences.
3.8	Hold	Inspection and Test Plan(s) submitted by the Constructor to SA Water Representative at least 10 working days before the work activity commences.

A2 Schedule of identified records

Section	Description of identified record
3.1	Quality management system (including associated registers)
3.2	Quality system audits
3.4	Quality plan.
3.5	Quality records
3.8	Completed ITPs
3.11	Test results (e.g. Soil test results on materials to be used for construction, Compaction density and moisture content test results, Weld test results, Concrete test results, Pipeline pressure test results, Surface preparation and protective coating records).
3.13	Permits and certificates
3.14	Site records
3.15	As-repaired/constructed report submitted by the Constructor to the SA Water Representative within four (4) weeks of the issue of the Certificate of Practical Completion.
3.16	Shop drawings