Strategic Product Specification

SPS 300
Water Meters – DN20
FOREWORD

Each Strategic Product Specification has been prepared to inform Water Corporation staff, consultants, contractors and land developers of the requirements for selecting and acquiring a manufactured product to be used in strategic Corporation infrastructure. The definition of ‘Product’ includes items that comprise assembled components, equipment or plant for mechanical, electrical and civil infrastructure applications.

The objective of a Strategic Product Specification is to specify fit-for-purpose Product which will contribute to the provision of effective water services at least whole-of-life cost and with least risk to service standards and safety. A Strategic Product Specification also provides uniform standards for compatibility of new water infrastructure with existing water assets.

Many Strategic Product Specifications have drawn on the design, asset management and operational experience of Product performance in live service gained by the Corporation over time. Some Strategic Product Specifications have drawn on the experience of the water industry nationally by referencing Australian or WSAA standards.

Strategic Product Specifications are intended for reference and use in the following typical procurement scenarios:

- Capital funded infrastructure design and construction work;
- Private developer funded subdivision infrastructure for takeover by the Corporation;
- Operationally funded infrastructure design and construction work;
- Corporation period contracts for Product purchases;
- Product purchases for stock or for miscellaneous minor work.

A published Strategic Product Specification will, in some cases, comprise technical content that is typical of a range of products of the same type (type specification) but may exclude specific requirements that should apply to a particular project or application. In such cases, the project designer is required to document the supplementary project specific requirements in the ‘Project Specific Requirements’ Appendix of the Specification.

The text of a published Specification should not be directly modified. In the event that a text variation is considered necessary to accommodate the needs of a particular project or application, the text modification should be documented in the appropriate Clause of a ‘Project Specific Requirements’ Appendix.

Enquiries relating to the technical content of this Specification should be directed to the Manager, Advisory Section, Engineering to whom all enquiries relating to the technical content of the Specification should be directed. Future Specification changes, if any, will be issued to registered Specification users as and when published.

Head of Engineering

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

Users should use and reference the current version of this document.

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REVISION STATUS

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

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1. GENERAL

1.1 Scope
This Specification details the requirements for DN20 water meters in lieu of specific clauses, or as clarification for options that exist within, or as additional requirements to AS 3565.1. Accordingly unless otherwise specified in this Specification, the meters shall be manufactured, tested and supplied in accordance with the requirements of AS3565.1 and/or National Measurement Institute (NMI) R 49 documents.

1.2 Referenced Documents
All standards referenced in this specification are contained in AS 3565.1, Clause 1.2 or NMI R 49-1 Section 2 with the exception of; AS/NZS 4158; Thermal-bonded polymer coatings on valves and fittings for water industry purposes.

1.3 Definitions
AS 3565.1 means Australian Standard, AS 3565.1 Meters for cold and heated drinking and non-drinking water supplies
Part 1: Technical requirements
Water Meter and Meters are interchangeable terms.
Contractor and Vendor are interchangeable terms.
Water Corporation and Corporation are interchangeable terms and is the Client.
Other relevant definitions are contained in AS 3565.1 and R49-1 Section 2

1.4 Classification and Rating

1.4.1 Technical Specification
The meters shall comply with the technical specifications contained in AS 3565.1 Section 2.

1.4.2 Accuracy Class
Meters shall be manufactured to Accuracy class 2 as defined in NMI R49-1 clause 3.2.2 and the minimum value of $Q_3/Q_1$ shall not be less than 200 as defined in NMI R49-1 clause 3.1.4.

1.4.3 Operating Conditions
The meters shall be suitable for operation in the following conditions,
- Surface temperature will vary from 0°C to 70°C.
- Water temperature will reach 50°C.
- Meters will be subjected to hydraulic shock loads which could exceed 1400kPa during rapid valve closures.
2. MATERIALS AND COMPONENTS

2.1 Materials for Water Meter Components

- Materials used in the manufacture of the meters, as a minimum, shall comply with the requirements of AS 3565.1, Clause 2.7.
- The meter body shall be manufactured using dezincification resistant copper alloy complying with AS 2345.
- The measuring chamber body, piston/rotating element and top plate (where applicable) shall be manufactured using stable engineering plastic with proven low wearing characteristics or copper alloy.
- The register window shall be of impact resistant glass. Alternatively, clear stable engineering plastic shall be considered.
- Stainless steel shall not be used where it is likely to be affected by shielded corrosion.
- All exposed external plastic components shall be resistant to prolonged ultraviolet light exposure and temperatures reaching 70oC and, in case of fire is self-extinguishing.

2.2 Preventing Contamination of Water

All components that are, or could come in contact with the potable water shall comply with AS 3855 and AS 2345 requirements.

2.3 Supplementary Devices

The meter shall be pre-equipped for future remote reading communications in accordance with the requirements of NMI R49-1 clause 5.7.3.

3. DESIGN, MANUFACTURE AND OPERATION

3.1 Design

Meters shall conform with the requirements of AS 3565.1/NMI R49 and

- Preference is for volumetric chamber type but other measuring methods will be considered.
- Be fitted with Protective Device/s NMI R49-1 Section 5.8.
- Incorporate an internal strainer - NMI R49-1 clause 5.3.2.
- Meters be fitted with Dual Check Valves that comply with AS 2845.1 and AS 3565.1, Clause 3.4 fitted on the outlet end.
- Operate within the accuracy limits specified for Class 2 meters.
- For mechanical meters, a magnetic drive system between the measuring chamber and the register capsule is preferred (and if required, with magnetic field protection) but other drive methods will be considered.
- The incorporation of an additional element to detect movement of the measuring device before it is perceptible on the register should be considered.
- Material/methods used in manufacturing register shall eliminate the forming of condensation, fogging or other forms of obscuring the registered reading under viewing window.
• Register window shall be protected by a hinged lid that is designed to remain closed under strong wind.
• Meter register shall have the capacity to display a minimum of 99,999kl (m3).
• Meters that require power shall comply with the requirements of NMI R 49-1 clause 4.2.

3.2 Design or Material Change

If the Contractor wishes to modify the meters accepted under the Contract in any way, the Contractor before proceeding shall,

Modifications

• Ensure that such modifications shall not be detrimental to, or reduce the performance of the meters as specified or as set in the relevant standards.
• Submit revised drawings/specifications for approval by the Water Corporation.
• Acceptance by the Corporation of any proposed modifications by the Contractor shall not constitute acceptance of any deficiencies in performance, which may result from the change/s.
• The Corporation may subject the modified meters to undergo Prequalification and/or Endurance testing process.

3.3 Threaded End Connections

Thread form shall be special thread 1.28” nominal diameter x 14 TPI (Threads Per Inch) Whitworth Form and the ends shall be suitably finished to form a watertight seal on a gasket.
For detailed thread tolerances refer to Table below:

3.4 Table 1: Meter End Thread Specification

<table>
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<th>SPS 300 TABLE 1: METER END THREAD SPECIFICATION (External)</th>
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NOTES

(A) Notation and nomenclature shall be as defined in AS 1722.2.
(B) The Minor Thread Diameter shall be not greater than the Basic Minor Diameter.
4. COATINGS
Coatings are not required unless the material used to manufacture the meters requires a coating to improve the resistance to internal or external corrosion (AS 3565.1, Clause 2.1.1). If the manufacturer deems that a coating is necessary, it shall conform to the requirements of NMI R 49-1 Clause 5.1 and AS/NZS 4158.

5. TESTING

5.1 Pre-requisites for Potential Suppliers
- As a minimum, meters shall have been granted pattern approval as required by NMI R49-1. Meters that have been granted 'pattern approval' may be exempted from pre-qualification testing mentioned below.
- Prior to a Vendor being accepted by the Corporation to supply meters, a batch of five (5) randomly selected meters shall be subjected to pre-qualification tests as detailed in:
  - APPENDIX A: POTABLE WATER METER PRE-QUALIFICATION PROCESS
  - APPENDIX B: POTABLE WATER METER ENDURANCE TESTING PROCESS
- The prequalification testing is performed at the Corporation's National Association of Testing Authorities (NATA) accredited Meter Testing Laboratory.

5.2 Initial Verification
- All meters shall conform to the requirements of NMI R49-1, Table 5.
- The Vendor shall have each meter tested to the principles outlined in NMI R9-2 Section 9 but only at the following flow rates before presenting them for acceptance;
  - Between 0.33 l/min and 0.37 l/min (Q1) and
  - Between 0.53 l/min and 0.59 l/min (Q2)
- Request to vary this test requirement will only be considered if test results from an independent NATA accredited laboratory are submitted for evaluation prior to a purchase order/contract being awarded.

5.3 Test certificates
Test Results
- The results of the above tests performed by the Contractor shall be tabulated. The certificate shall be in accordance with NMI R49-2 Section 10. As a minimum the certificate shall include the relevant serial number of each meter tested and the results of the tests performed to establish compliance to:
  - Error of Indication NMI R49 – 1, section 6.2.4.1.
  - Static Pressure Test; NMI R 49-2 Section 6.2.

Forwarding Test results
- The test results shall precede/accompany each batch of meters presented for acceptance. Preference is for electronic certificate but hard copy is acceptable.
5.4 Testing Of Delivered Meters Prior To Acceptance

Acceptance Test Samples

- The Corporation shall take a random selection of one meter per every 100 meters from any delivered batch of meters. Where less than 100 meters are delivered, a minimum of one meter shall be tested.

Acceptance Tests Performed

As a minimum the following tests will be performed on every sample:
- Error of Indication at the following flow rates; 0.5, 5, 10, 20 & 40 litres/minute (WSAA - In Service Compliance Testing Code of Practice suggested flow rates).
- Static Pressure Test; NMI R 49-2 Section 6.2.
- Opening and closing operation of Dual Check valves to AS 2845 Appendix F and U.

Test Failures

- If any of the samples fail any of the tests, the entire batch from which the sample/s were selected shall be rejected in total.
- At the Contractor's cost, the rejected batch of meters shall be picked up. Resubmitted meters shall be treated as a new batch and undergo acceptance testing.

6. COATING TEST

If applied, thermal-bonded polymeric coatings shall be tested in accordance with AS/NZS 4158.

7. MARKING

7.1 Identification Markings

In accordance with NMI R49-1 section 5.6.

7.2 Unique Numbering

The Corporation will determine and provide the water meter serial number matrix. The meter size code, manufacturer code, year of manufacture and sequential serial numbers to be used (normally 9 alphanumeric characters but can be 10) will be provided. The supplier is responsible in all instances to ensure that the unique serial numbers are not duplicated and are correctly applied.
7.3 Water Corporation Unique Numbering System

The unique numbering format is as follows:

- First # = Capital alpha character denotes meter size and is always B for DN20 meters
- Second # = Capital alpha character identifies meter make/manufacturer – assigned by Water Corporation and can be used for any meter size provided by the manufacturer/supplier
- Third # (Optional) = Capital Alpha 'B' character to denote meter manufacturer with 2 x Water Corporation Approved meters of same size, provided less than 99,999 to be purchased, (eg: Elster DN20 V100 & V200 meter)
- yy = year of manufacture (last two numbers of year of manufacture)
- mmmm = sequential serial number commencing at 00001 and reset at the beginning of each calendar year

Example: BC1500001
Example: BK2000001 (Elster V200) 9 Characters, with potential for 10 characters for over 99,999 meters
Example: BKB2000001 (Elster V100) 10 Characters, but under 99,999 meters

7.4 Serial Number Characteristics

- The unique serial number shall have an apparent height of not less than 6mm.
- Serial numbers shall be permanently marked on either the body or plastic components of each meter and shall remain readable for the service life of the meter (not less than 15 years).
- Serial numbers shall be capable of being read from a position directly above the meter.
- Serial numbers and registration readings shall be capable of being read from the same position.

7.5 Theft Mitigation Characteristics

- Brass meter bodies shall be sprayed with Microdot Technology to mitigate theft and enable Police Identification and Proof of Asset Ownership.
- Microdot Technology shall be designed utilising the Water Corporation’s Logo and approved by the Principal in writing.
- Meter Capsules shall be permanently marked with Water Corporation Logo and include ‘Marked for Police Identification’.

- Alternative technologies may be acceptable following formal submission(s) and acceptance by the Principal in writing.
8. STORAGE and TRANSPORT

8.1 Protection for Transporting

- Covers shall be fitted to inlet and outlet ends to protect threads during transport and storage.
- The meters shall be securely packed on pallets and shall be protected from damage in transit.

8.2 Batch/Pallet Size

For 20mm meters, delivery shall be in batches of not less than 200 and not more than 400 per pallet.

8.3 Delivery Details

The meters shall be delivered free into the Corporation's meter store/s located in the Perth metropolitan area (37 Lemnos St SHENTON PARK W.A. 6008).

9. TRACEABILITY

Contractor shall ensure the traceability of meter components.

10. DEFECTS LIABILITY

10.1 Non-Compliant Meters

At no cost to the Corporation, the Contractor shall rectify or replace any meter not complying with the requirements of AS 3565.1, NMI R 49 documents and/or this specification where the defect is a result of the Contractor’s faulty design, materials and/or workmanship.

10.2 Warranty

The warranty shall be for six (6) years from acceptance of batch, or at a registration of 2,000kl, whichever occurs first.

10.3 Defective Meters

- Defective meters will be returned to the Corporation's meter store located at 37 Lemnos Street, Shenton Park and the Supplier will need to arrange pickup of the defective meters at their cost for examination.
- Where possible meters will be returned with protection devices intact.
- If the meter is determined to be defective, the Supplier will at no cost to the Corporation replace the meter and provide a report on why the meter failed.
- The Corporation, at its own cost, retains the right to dismantle a meter to determine liability at the complete stoppage of internal components or at the expiry of the above limits.
10.4 Supplier’s Contribution
The Contractor shall pay the Corporation the sum of $30 per meter in contribution of the costs incurred to remove and replace defective meters.

10.5 Notification of Common Faults
The Contractor shall notify the Corporation in case of common fault/s likely to affect the operational efficiency of the meters being identified by their own testing, third party testing and/or by other users of the meters supplied.
11. APPENDICES

11.1 APPENDIX A: POTABLE WATER METER PRE-QUALIFICATION PROCESS

NOTE:

1) METER PRE-REQUISITES
   - Samples provided are currently covered by Pattern Approval to NMI R49
   - Comply with Water Corporation SPS 300
   - Samples to be fitted with Dual Check Valves
2) SAMP 1 is only used in the “Error of Indication” tests to assess/compare the accuracy profile against the other samples
3) Testing will be terminated if a failure of a sample occurs at any stage throughout the testing. Replacement samples will NOT be accepted
4) Progressive test results will not be communicated to supplier – if requested the stage/progress of test will be communicated
5) Test results remain the property of the Water Corporation and can be used/distributed to water utility groups e.g. Water Services Association of Australia and/or National Measurement Institute
6) PASS criteria as specified in the relevant reference document
11.2 APPENDIX B: POTABLE WATER METER ENDURANCE TESTING PROCESS

NOTE:

1) Meter samples must have passed Water Corporation PRE-QUALIFICATION testing
2) SAMP 1 is only used in the “Error of Indication” tests to assess/compare the accuracy profile against the other samples
3) Testing will be terminated if a failure of a sample occurs at any stage throughout the testing. Replacement samples will NOT be accepted
4) Progressive test results will not be communicated to supplier – if requested the stage/progress of test will be communicated
5) Test results remain the property of the Water Corporation and can be used/distributed to water utility groups e.g. Water Services Association of Australia and/or National Measurement Institute
6) Meter samples are deemed to have failed if the accuracy exits a +/- 4% band. Testing may still continue to the end of the process or depending on the failure reason it could be terminated

Prequalification tests completed and meters are compliant

Remove filter and run ENDURANCE test rig for a period of time to determine that test line has been purged and that solenoid valves are operating at specified time intervals

Fit 80 micron filter and replace after every 500kl cycle

Depending on number of samples to be tested it may be necessary to break the samples into several batches to be able to achieve Q5 flow rate

Fit meters onto ENDURANCE test rig. If more than one supplier alternate samples along test line – manufacturer A, manufacturer B etc.

Record initial meter registrations for each sample and commence test process

Check meters and record registration on a daily basis (except non-working days)

Further testing may be terminated on all samples from the supplier

Stop test rig when the samples have recorded an average increase in registration of 500kl

Visual observation – to determine if meter is operating

Perform Error of Indication tests including SAMP 1 to Water Services Association of Australia Code of Practice “In Service Compliance Testing” Table 3 (4 point test)

Criteria: +/- 4% at Ew using weighting as detailed in WSAA “In Service Compliance Testing” Code of Practice

Return meters to ENDURANCE test rig and alternate the sequence of supplier for the first meter in the test line each time the meters are returned to the test rig

Test DCV operation to AS 2845.1 Appendix F & U (Not on SAMP 1)

Stop test when the samples have recorded an average increase of 500kl in registration

Prepare DRAFT report for Procurement Services after meters have exceeded a registration of 100,000kl

Meeting with Procurement Services and MTL to finalise report

Procurement Services invites supplier representative to present and discuss report regarding their meter samples

Procurement Services
## 11.3 APPENDIX C: MATERIAL MASTER RECORDS

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Note: To be Pre-equipped for Future Remote Reading Communications without the need to Remove/Replace any Meter Component. |  |
| 22555| Water Meter; Confined Space / Meter Box (Grenade Type); Copper Alloy Body; DN20; PN14; Measurement Class 2; Q₃ 4kL/hr, Q₃/Q₁ Ratio of 200; Preferred Overall Length to AS 3565.1 Table 2.1 Specifications, (Nom. Length - 154mm); C/W Acetal Integral Dual Check Valves (DCV's); C/W 'Microdot Technology' for Theft Mitigation and Police Identification **Purposes; Threaded End Connections - Special Thread.**  
Note: If Installed in High Temperature, High Chlorine Areas, Filter Insert (MMR 22448) must be installed in Meter Tailpiece (MMR 13566) Downside.  
Note: To be Pre-equipped for Future Remote Reading Communications without the need to Remove/Replace any Meter Component. |
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