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1. Introduction

National Water Meter Standards (NWMS) are being developed under the National Water Initiative (section 88) which sets out the requirement to develop a national meter specification and national meter standards specifying the installation of meters. This work is being coordinated by the Metering Expert Group.

A key requirement of the NWMS is that meters must be pattern approved by the National Measurement Institute, and installed in accordance with ATS 4747.

At the present time there are no meters that have been pattern approved, and in the initial stages of the NWMS, the number of meters that are pattern approved will be small.

To enable the requirements of the NWI to be progressed, these NSW Interim Water Meter Standards (Interim Standards) are designed to cover new meters installed in NSW prior to the effective operation of the National Water Meter Standards.

The NSW Interim Standards are designed to reflect the scope and intention of the NWMS, and enable purchase and installation of new meters until the full National Water Meter Standards become fully effective.

These Interim Standards will enable exemption (under the NWMS) to be provided to new meters installed to the NSW Interim Standards which were developed in good faith to meet the emerging national standards.

Once approved by the NSW Commissioner for Water, these Interim Standards will enable new meters to be installed with confidence that they will not need to be removed at a later stage under the grandfathering condition of the NWMS.

Where these Interim Standards refer to action or approval being required by the NSW Commissioner for Water, this action or approval may be delegated by the NSW Commissioner for Water to the Chief Executive Officer of State Water Corporation.

These Interim Standards apply to all new and replacement meters and to those meters installed under programs to improve and extend the extent of metering in NSW. In particular, the Interim Standards apply to new meters installed under the Hawkesbury Nepean River Recovery Program, and the Murray Darling Sustain the Basin Program.

An existing installed meter, which has already been approved for operation under previous regulatory arrangements, will not be subject to compliance with the Interim Standards. However, such an existing installed meter will be subject to the requirements of the full National Water Meter Standards once those standards become fully effective.

At a time when the National Water Meter Standards become fully operational, and when there is a sufficient supply of pattern approved meters, the NSW Interim Standards will be withdrawn, and all meters in NSW will come under the operation of the National Standards.

The NSW Interim Standards replace the NSW Water Extraction Monitoring Standards. The NSW Interim Standards will apply to all new meters installed from the date of approval of the Interim Standards by the NSW Commissioner for Water.

2. Background

The National Water Initiative (NWI) Agreement provides a strategy for improving water resource management across Australia. In relation to water meters, paragraphs 87 and 88 of the Agreement specify requirements for national metering standards and a nationally consistent framework for water metering and measurement. In addition, paragraph 89 specifies open reporting requirements relating to metered water use and associated compliance and enforcement actions. As Council of Australian Governments (COAG) signatories, all State and Territory ('jurisdictional') governments are committed to these objectives.

Recognising that requirements for urban and non-urban water meters differ due to highly variable installation configurations and operating conditions in non-urban environments, a national framework (the 'Metrological Assurance Framework') has been developed to enable implementation of new standards for non-urban water meters and to accommodate future trade measurement requirements.

National Framework for Non-urban Water Metering Policy Paper sets out the framework and arrangements agreed by jurisdictional government and industry representatives as members of the Metering Expert Group appointed by the Commonwealth Government.

The *National Framework for Non-urban Water Metering Policy Paper* delivers the primary objective agreed by jurisdictional governments that the national metering standards should seek to provide an acceptable level of confidence that measurement performance under in situ conditions is within maximum permissible limits of error of +5%.

The starting date of the NWMS was scheduled for 1 July 2009, but has been deferred to a date to be determined.

3. National and State Implementation Plans

As set out in the *National Framework for Non-urban Water Metering Policy Paper* jurisdictional governments shall implement national standards for non-urban meters and the Metrological Assurance Framework in accordance with this policy. Implementation shall be undertaken through:

- The national implementation plan for non-urban metering approved by the Commonwealth Government
- State implementation plans for non-urban metering prepared by the relevant jurisdictional departments or agencies and endorsed by the Commonwealth Government.

4. Requirements of the NSW Interim Standards

For meters installed under the control of the NSW government the following NSW Interim Standards will apply:

Meter Body

All meters should be pattern approved, be initially verified and have verification mark/stamp prior to installation. HOWEVER if a suitable pattern approved meter is not readily available, a meter may be installed that:

1. Is designed and manufactured such that the maximum error does not exceed $\pm 2.5\%$ after manufacture, EXCEPT where the meter consists of more than one components that are combined in the field, in which case the maximum error of the combined meter must not exceed $\pm 5\%$ as measured in the field
2. Has written confirmation that the above maximum errors are not exceeded. Such written confirmation may be in the form of an approval under a regulatory regime similar to pattern approval, or other internationally recognised standard (this may include, but not be restricted to, test results for meters tested overseas in ILAC signatory accredited laboratories). Written confirmation may also be of the form of a test certificate or other evidence from a reputable testing authority.
3. Is suited to the intended purpose, installation configuration and operating condition
4. Is provided with a specification from the manufacturer to identify the recommended installation conditions, including the identification of any adverse conditions that would impact on the maximum error.
5. Is installed in accordance with any requirements of the manufacturer and Australian Standards or Australian Technical Specifications (including ATS 4747), or manufacturer's specifications, such that there is an acceptable level of confidence that the meters will operate within the maximum permissible limits of error ($\pm 5\%$) allowable under in situ conditions.
6. Is inspected after installation by an Approved Person (see later section of the Interim Standards) to ensure the meter's suitability and its installation in accordance with any requirements of the manufacturer and ATS 4747. Such checks should involve examining the meter (or measuring system, including its component parts) to ensure it has a relevant identification mark and is correctly installed in accordance with the relevant Australian Standards or Australian Technical Specifications and manufacturer's specifications. For closed conduits, this should involve checking the installation to ensure that the lead-in / lead-out pipe lengths are of the specified length; for open channels, calibrating weirs and height gauges and inspecting upstream and downstream infrastructure to minimise potential obstructions impacting on the performance of the measuring device; for closed conduits, checking the meter internals (via meter capsule removal or lead-in /lead out disassembly) and where necessary removing and cleaning pipe lengths to ensure they are straight, round and free from obstruction; where appropriate.
7. Is provided with a seal that is approved by the NSW Commissioner for Water to prevent tampering
8. Is maintained in accordance with any requirements of the manufacturer and ATS 4747.
9. Progressively totalises the cumulative volume of water diverted, and displays the accumulated total volume on a visible register at any time.
10. Is installed and operated such that the meter displays the accumulated total volume to an in-service maximum permissible error of $\pm 5\%$ of the actual (true) accumulated total volume, and maintains that accuracy rate at any and all of the discharge rates of the diversion work as it is installed and operated, and ensure that this discharge rate is within the design flow rates as specified by the manufacturer.
11. Displays the accumulated total volume in standard metric units.
12. Displays the units of measurement adjacent to the accumulated-total-volume display.

13. Displays the integers of an accumulated total volume in digital form.
14. Has sufficient capacity to record more than one year of flow measurement.
15. Is constructed so as to allow the incorporation or connection of data-logging equipment.
16. Is able, where it incorporates or is connected to data-logging equipment, to collect and transmit data in accordance with the requirement of the NSW Commissioner for Water.
17. Displays on its register or registers at any time precisely the same value as the value recorded in any associated data logger.
18. Has no facility for manipulating or resetting a register or data logger, or for manipulating or disabling its flow-measurement, recording or display functions.
19. Incorporates a facility for sealing against manipulation and tampering.
20. Is constructed and installed so as to allow convenient inspection and checking of components.
21. Is clearly and permanently marked with the name of its manufacturer and with a unique identifying number or alpha-numeric identifier.

Meter Site

Many types of meter are sensitive to flow disturbance. The primary means to eliminating disturbances is to surround the meter with straight lengths of pipe with no off takes or intrusions.

22. A meter which is NOT of a FULL-BORE ELECTROMAGNETIC design must be installed such that there is straight, rigid and of unobstructed uniform circular cross-section for a length equal to at least TEN times its internal diameter upstream, and at least FIVE times its internal diameter downstream of the meter, EXCEPT if the NSW Commissioner for Water has accepted (prior to installation of the meter and based on evidence that the required accuracy level can be attained) lesser lengths.
23. A meter which is of a FULL-BORE ELECTROMAGNETIC design must be installed such that there is straight, rigid and of unobstructed uniform circular cross-section for a length equal to at least FIVE times its internal diameter upstream, and at least THREE times its internal diameter downstream of the meter, EXCEPT if the NSW Commissioner for Water has accepted (prior to installation of the meter and based on evidence that the required accuracy level can be attained) lesser lengths.
24. Wherever practical, a meter should not be installed in close proximity to a pump, but if this cannot be avoided, there must be straight, rigid and unobstructed uniform circular cross-section for a length equal to at least TWENTY times its internal diameter between the meter and any pump located upstream of the meter, as set out in ATS 4747.5..
25. The flowmeter must be sited and installed so that its visible register is accessible to be read at any time.
26. A flowmeter pit or enclosure must have sufficient space to allow easy removal or dismantling of the flowmeter for inspection.
27. Flowmeter-access handrails, ladders and platforms must be fixed, and be constructed to comply with the *Occupational Health and Safety Act, 2000*, and regulations thereunder.
28. Where a mains electricity supply is connected to the flowmeter or to any ancillary apparatus, the works must comply with the relevant electrical installations standards and any associated requirements

29. The flow meter site, and access to it, must be kept clear of any oil, grease, noxious fumes and hazardous materials.
30. The flowmeter site and access to it must be clear of any unguarded moving machinery.
31. The flowmeter site and access to it must be safe and free from danger
32. Adequate vehicular access must be provided from the nearest appropriate public road to the flowmeter site.
33. Access to the flowmeter site must not involve climbing any fences or gates, or passing through any streams, channels or gullies at any time.

Meter Maintenance

The following **principles** will apply to meter maintenance:

34. All maintenance shall be undertaken such that there is an acceptable level of confidence the meter continues to operate within the maximum permissible limits of error allowable under in situ conditions ($\pm 5\%$);
35. Maintenance of a meter shall only be undertaken by a person who is an Approved Person under the NSW Interim Standards
36. A meter must be re-calibrated if its metrological performance has been affected by maintenance of the meter;
37. The metrological performance of a meter is considered to have been affected by maintenance (and hence re-calibration is required) if the seals on the meter are broken or removed by a person who is not an Approved Person under the NSW Interim Standards;
38. Re-checking by an Approved Person (under the NSW Interim Standards) of the installation is required if maintenance interferes with the installation (e.g. where the meter has been removed for laboratory re-calibration, or the meter has been shifted to a new location; or in the case of a metering system, where the configuration has been altered or one or more components of the system have been altered or replaced).

Types of maintenance

Maintenance consists of corrective, preventive and predictive maintenance. Corrective maintenance shall be undertaken as soon as practical after a fault is discovered. Preventive maintenance includes regular inspection of meters and installations to identify any departures from those requirements stipulated in the meter's pattern approval certificate. Predictive maintenance includes the analysis of meter/usage data either to establish an optimal replacement frequency based on economic objectives or to establish whether meters should be replaced as the result of an evaluation of a sample of meters.

Maintenance plan

A maintenance plan shall be developed and shall be approved by the NSW Commissioner for Water to deliver the necessary elements that reflect the key elements of the Metrological Assurance Framework. The plan shall include the following:

39. Details of compliance checks as required by auditing, checking and readings programs
40. Details of corrective, preventive and predictive maintenance schedules, and associated procedures

41. Details of predictive maintenance methods and associated procedures
42. Identification of the resources that will undertake the maintenance, such as approved designated personnel or subcontractors, and the certifications held by team members and supervisors.

Ancillary Equipment

If required by the NSW Commissioner for Water the meter must:

43. be equipped with an electronic data logger to record readings
44. be equipped with a telemetry device to allow remote reading on the meter

In-Situ Meter Testing Facilities

If required by the NSW Commissioner for Water the meter must have site facilities that will allow checking of the accuracy of the installed meter. Such in-situ facilities may consist of one or other of the following.

45. flow diversion devices (to allow water to be run through an independent meter)
46. access valve (to allow the insertion of a measuring probe of a portable independent meter)
47. section of suitable pipe (to allow the use of a portable clamp-on independent meter).
48. section of pipe with flanges (to allow an independent meter to be inserted in line).

Approved Persons

Persons who undertake work on meters (including installation, maintenance and validation) should hold certification issued by a nationally recognised, industry-based certification scheme: Certification should be competency-based and will recognise qualifications and/or equivalent experience. Under these NSW Interim Standards, a person will be approved to undertake work on water meters if they are

49. accredited as a Certified Person by Irrigation Australia Limited (or other accredited provider) under the NWMS, or
50. approved by the NSW Commissioner for Water as being able to perform the task in accordance with the intentions of the National Water Meter Standards

Glossary

COAG	Council of Australian Governments
ILAC	International Laboratory Accreditation Cooperation
NWI	National Water Initiative
NWMS	National Water Meter Standards

References

Water Metering Expert Group (2008) *The National Framework for Non-urban Water Metering Policy*. Final Draft. viewed 1-Oct-2009
<<http://www.environment.gov.au/water/publications/agriculture/ris-metering-non-urban.html>>

Legislation

National Measurement Act 1960 (Commonwealth)

Occupational Health and Safety Act, 2000 (New South Wales)

Standards

ATS 4747 Australian Technical Specification suite: *Meters for non-urban water supply* includes:

ATS 4747.1:2008 Meters for non-urban water supply: Part 1: Glossary of terms.

ATS 4747.2-2008 Meters for non-urban water supply: Part 2: Specification for closed conduit meters fully charged

ATS 4747.3-2008 Meters for non-urban water supply: Part 3: Specifications for open channel meters

ATS 4747.5-2008 Meters for non-urban water supply: Part 5: Installation and commissioning of closed conduit meters fully charged

ATS 4747.6-2008 Meters for non-urban water supply: Part 6: Installation and commissioning of open channel meters

APPENDIX A – Metrological Assurance Framework

This appendix reflects the main components of the national Metrological Assurance Framework, and guides the content of the NSW Interim Standards

Key Requirements

Non-urban meters shall comply with the following key requirements of the Metrological Assurance Framework to ensure an acceptable level of confidence in meter performance. All non-urban meters shall be:

- Pattern approved by the National Measurement Institute (NMI) where available [Where pattern approval is not available for meters or measuring devices, a contemporary meter or metering system approved by the relevant jurisdictional department or agency would be acceptable. Use of an approved meter must still provide an acceptable level of confidence that it will perform within the maximum permissible limits of error in field conditions ($\pm 5\%$).]
- Laboratory verified by a Verifying Authority under the *National Measurement Act 1960* (Cth), prior to installation
- Suited to the intended purpose, installation configuration and operating conditions
- Installed in compliance with the Pattern Approval certificate and the appropriate Australian Standards
- Validated by a certified validator after installation and before water is taken through the meter under an entitlement
- Maintained periodically in accordance with the Pattern Approval certificate and relevant Australian Standards or Australian Technical Specifications (e.g. ATS 4747)
- Periodically validated by a certified validator on an ongoing basis
- Able to provide an acceptable level of confidence without in situ verification that performance of the meter is within the maximum permissible limits of error ($\pm 5\%$) in field conditions
- Re-verified (either in a laboratory or in situ when and where practical and preferred) by a Verifying Authority or certified licensee under the *National Measurement Act 1960* (Cth) following maintenance affecting the metrological performance of the meter. [In situ re-verification may not be possible where very large meters or measuring systems are used in high capacity applications; or where physical access is a safety concern; or where adequate facilities are unavailable; or where costs are prohibitive. However, even where it is possible to undertake *in situ* re-verification, laboratory re-verification may be selected as the preferred option]
- Audited on a regular basis by water service providers, government agencies or independent auditors in accordance with national and state implementation plans.