Water Metering Code

May 2024, Version 1.6

D2023/135799

PowerWater

Foreword

The Water Metering Code (the Code) sets out how Power and Water Corporation (Power and Water) will manage customer water meters it owns. The Code is required by legislation set out in the *Water Supply and Sewerage Services Act 2000* (WSSS Act) and is approved by the Utilities Commission.

WSSS Act, Section 72(1) states *'A licensee must develop and publish a code setting out the arrangements and conditions for installing, testing, verifying and replacing meters owned by the licensee.'*

The Code (this document) specifically addresses Section 72(1) in the following sections:

Section	Title
Section 4	Meter compliance
Section 5	Meter assembly requirements
Section 6	Meter testing and verifying
Section 7	Meter replacement

Additional sections of the WSSS Act covered by the Code include:

- 73(2) – The conditions on which a portable meter will be issued and the conditions relating to its use are to be contained in the licensee's metering code.
- 74(1) – A customer to whom a water supply is made available through a meter installed by a licensee on land must ensure that it remains accessible to the licensee in accordance with the licensee's metering code.

Rev	Date	General Description	Prepared	Reviewed	Endorsed
1	24/03/23	Draft Water Metering Code – Utility Commission's comments incorporated	J Ciarla	D Chin	N Islam
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Approved			Lyndon Rowe Utilities Commissioner Utilities Commission Northern Territory		

Contents

1 Definitions

Term	Definition
Cold water meters	Designed and built to measure the consumption of water at temperatures of approximately 30 degrees Celsius.
DN	Nominal internal diameter in millimetres (i.e. DN20 is 20mm internal diameter).
Error decay	A relationship that represents the relative measurement error over time.
Mechanical meters	A meter technology that extracts energy from the flowing water in order to achieve a measurement such as piston/volumetric, single-jet, multi-jet and turbine/Woltman/inferential meters.
NATA	National Association of Testing Authorities, Australia (NATA).
National Measurement Institute (NMI)	The Australian Government's national authority on measurement that: • develop and maintain national measurement standards that are recognised internationally • deliver world-class measurement products, advice and client services • administer the regulatory framework for measurement.
Non-potable water	Water that is not intended for drinking water but may be used for other purposes dependent on water quality.
Permanent flowrate (Q_3)	Highest flowrate within the rated operating conditions, at which the water meter is required to operate in a satisfactory manner within maximum permissible error.
Portable water meter	Meters that change locations and do not have a defined address.
Potable water	Water that is intended for use as drinking water that meets Australian Drinking Water Guidelines.
Solid state electronic meters	A meter technology that adds energy to the flowing water in order to achieve a measurement such as ultrasonics (e.g. Doppler and time-of-flight), electromagnetic (pulsed direct current and alternating-current) and remnant magnetic field meters.
The Code	Power and Water Corporation's Water Metering Code – this document.

Term	Definition
WSAA	Water Services Association of Australia.
WSSS Act	The *Water Supply and Sewerage Services Act 2000*.
Wastewater	Water that has been used. Includes greywater (from bath, showers and washing machines) and blackwater (from toilets).

2 Introduction

2.1 Background

Power and Water Corporation (Power and Water) provides water and sewerage services to 19 urban and 72 remote centres across the Northern Territory. For the urban centres, Power and Water provides these services under licence as required by the WSSS Act. The objectives of the WSSS Act are to:

a) Promote the safe and efficient provision of water supply and sewerage services.
b) Establish and enforce standards of service in water supply and sewerage services.
c) Facilitate the provision of financially viable water supply and sewerage services.
d) Protect the interest of customers.

Division 11 of the WSSS Act addresses the requirements of water metering.

Section 71 states that Power and Water may install a water meter for the purpose of measuring the volume of water supplied to a customer. Customers are charged (billed) by Power and Water for this volume of water supplied based on the current pricing order.

2.2 Application

The Code applies to all meters owned by Power and Water where potable water, non-potable water and/or wastewater reuse water is metered for billing purposes.

2.3 Purpose

The Code sets out the arrangements and conditions for installing, testing, verifying and replacing meters owned by Power and Water as per Section 72(1) of the WSSS Act.

2.4 Legal basis

Power and Water is licensed by the Utilities Commission under the WSSS Act, to provide water supply and sewerage services in the Northern Territory. Section 72 of the Act states:

> (1) A licensee must develop and publish a code setting out the arrangements and conditions for installing, testing, verifying and replacing meters owned by the licensee.
>
> (2) A metering code must be approved by the Utilities Commission.
>
> (3) A metering code must be in accordance with guidelines published by the National Standards Commission.

3 Scope

3.1 Approach

The Code identifies and aligns to national standards and industry codes of practice for water meters, to specify meter installation, testing verification and replacement requirements.

3.2 Relevant standards and codes of practice

The National Measurement Institute has developed a suite of mandatory standards that are underpinned by the *National Measurements Act 1960*. Standards Australia has also developed various standards and Water Services Association of Australia (WSAA) has developed a number of codes and practises governing a range of metering related issues listed below:

3.2.1 National Measurement Institute Standards

- NMI R 49-2 Pattern approval and initial verification.

3.2.2 Australian Standards

- AS 3565.4 – Meters for water supply – In-service compliance testing.
- AS/NZS 3500.1 – Plumbing and drainage Water services.

3.2.3 Water Services Association of Australia (WSAA) codes of practice

- WSA 11 – Compliance Testing of In-Service Water Meters Version 1.1.

3.3 Objectives

The objectives of the Code are to:

- Set out the arrangements and conditions for installing, testing, verifying and replacing meters.
- Adopt consistent metering practices.
- Specify minimum technical, design and operational requirements for potable water, non-potable water and wastewater re-use metering.
- Provide a sound metering foundation for billing purposes.

4 Meter compliance

No water may be taken from Power and Water's infrastructure unless it has been measured by an appropriate meter as the basis for an account. Water may only be taken from designated network connection points and in compliance with backflow prevention requirements. This does not apply to Fire and Emergency Services and related emergency events.

4.1 Meter standards

Section 71(4) of the WSSS Act mandates that meters must comply with the *National Measurement Act 1960*. Power and Water shall only purchase and install meters approved by the National Measurement Institute (NMI) as per NMI R 49-2.

Materials, techniques, testing, workmanship and finish throughout shall comply with the provisions and requirements of the Australian Standards, AS 3565.4. Where no Australian Standard exists, materials, testing, techniques, workmanship and finish throughout shall comply with the provisions and requirements of:

- International Standards Organisation (ISO).
- Organisation International of Legal Metrology (OIML).
- International Electrotechnical Commission (IEC).

4.2 Meter function

Each meter will be capable of measuring and displaying the flow of potable water, non-potable water or wastewater reuse in kilolitres. The size and type of meter will be appropriate for the individual customer's overall average consumption as well as minimum and maximum flow rates. Power and Water is responsible for approving the size and type of meter.

4.3 In-service meter performance

In-service meter accuracy will be determined by standardised meter sampling and testing as per AS 3565.4 and WSA 11. Section 6 outlines the requirements for meter testing.

4.4 Portable water meters

Meters are normally located at a specified property to record consumption. However, under Section 73 (1) of the WSSS Act a licensee may issue to a person a portable meter that is not attached to the licensee's water supply infrastructure.

The issue and use of a portable water meter will be in compliance with Power and Water's portable water meters terms and conditions of use published on Power and Water's website below:

Portable water meter | Power and Water Corporation (powerwater.com.au)

Portable water meters follow the same requirements under the WSSS Act as other water meters in the Code, which includes installing, testing, verifying and replacing.

5 Meter assembly requirements

A meter assembly is the apparatus that may consist of valves, strainers, backflow devices, upstands, pipework and any other ancillary components associated with/required to support the measurement of flow through a customer connection. A meter assembly does not include the meter device used to measure and record the water flow through a customer connection.

Power and Water's Connection Code for Water Supply and Sewerage Services documents the requirements for new connections and is available on Power and Water's internet site (www.powerwater.com.au):

Connection Code for Water Supply and Sewerage Services

In addition, Power and Water's standard drawings for water services documents the requirements for a meter assembly. These are also available on Power and Water's internet site:

Water Supply and Sewerage Services Standard Drawings

If a water meter assembly is found to be non-compliant on Power and Water's side, then the assembly will be made compliant within 90 days by Power and Water.

If a water meter assembly is found to be non-compliant on the customer side, the customer will be advised in writing and required to rectify the non-compliance within 90 days starting from when the notice is sent. Failure to do so may result in restriction of supply.

5.1 New assemblies

Power and Water is responsible for the supply and installation of all water meters in new installations. Customers and property developers are responsible for the supply and installation of new and upgraded meter assemblies (excluding the water meter) as per the Code and Power and Water's Connection Code for Water Supply and Sewerage Services, Power and Water's standard drawings and AS/NZS 3500.1. Figure 1 is an illustration only identifying the responsibilities of Power and Water and the customer.

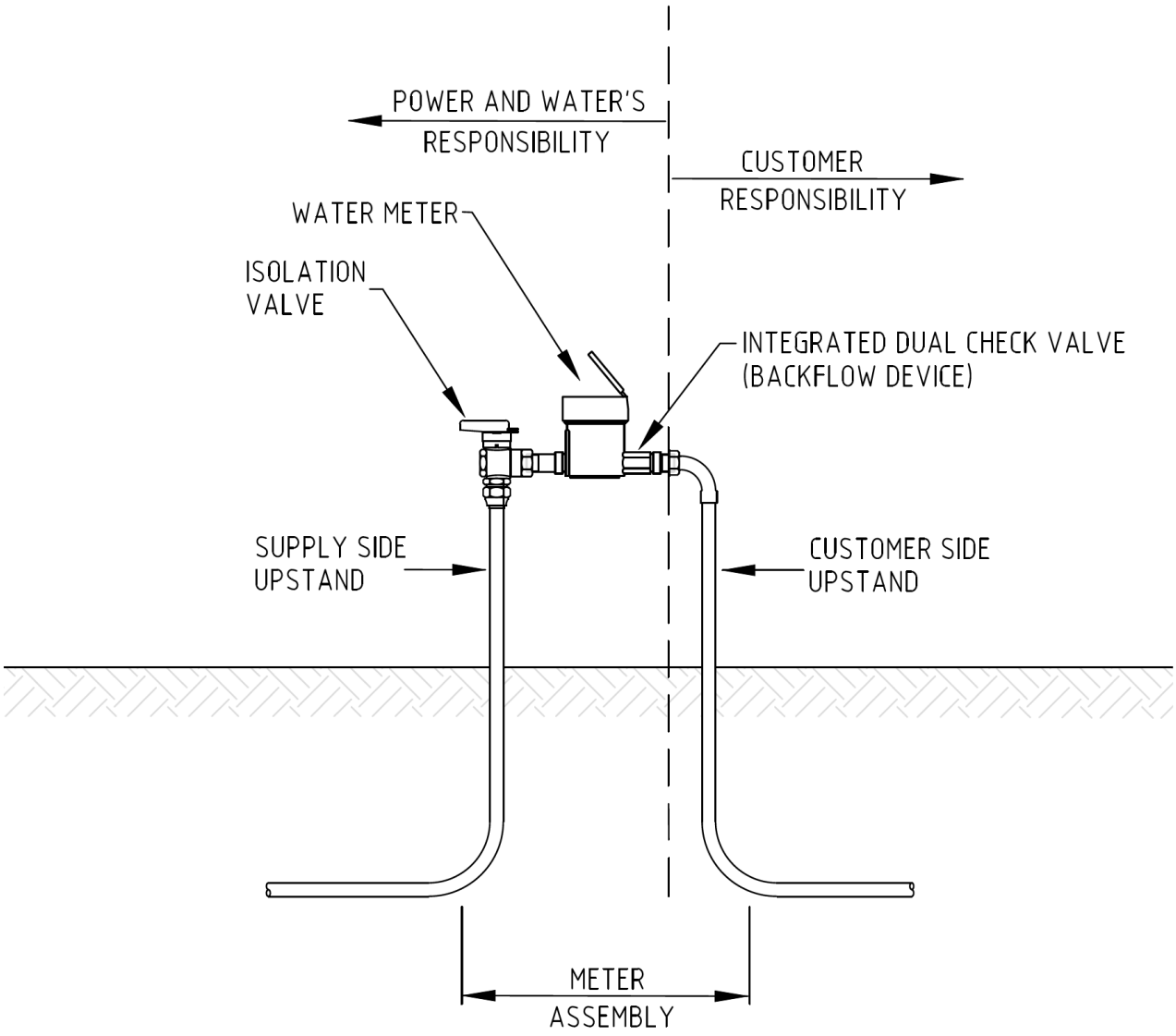

Figure 1: Illustration of typical residential water meter assembly

AS/NZS 3500.1 includes additional requirements for wastewater reuse or non-potable water assemblies.

5.2 Existing assemblies

Power and Water is responsible for the maintenance and replacement of water meters, supply side isolation valves and supply side upstand in existing installations. Customers are responsible for the maintenance and replacement of all other components including the upstand on the customer side of the meter, backflow prevention devices and isolation valves after the water meter.

In cases where backflow prevention devices are integrated within the water meter, the backflow prevention device remains Power and Water's responsibility.

Existing assemblies installed prior to the introduction of the Code shall be deemed compliant, provided they fully comply with the requirements of the day. However, any new or upgrades to an existing installation must be fully compliant to the Code.

5.3 Ancillary components

Ancillary components refers to components required for a meter assembly in addition to the meter. Ancillary components will vary depending on the size and type of installation. Components include isolation valves, backflow prevention devices, air valves etc.

Power and Water's standard drawings referenced in Section 5 document the requirements of typical ancillary components.

5.4 Backflow prevention

Backflow prevention devices are valves incorporated in the meter or the meter assembly to prevent potentially harmful water from entering the water supply due to backflow.

Power and Water's Connection Code for Water Supply and Sewerage Services referenced in Section 5 document the requirements for backflow prevention devices.

5.5 Access to meter assembly

Customers must provide Power and Water with easy access to any meter on their property. Customers are required to maintain access to the water meter so they do not become buried by garden dressing or fill, covered by concrete, paving, or inaccessible due to overgrown trees and plants.

Where any such obstruction prevents access to the meter, Power and Water will request the customer to remove the obstruction preventing access to the meter or specify a time during normal working hours for access to the meter as per Section 74 (2) of the WSSS Act.

5.6 Metered filling point assemblies

Power and Water has a number of card operated water filling stations for use by water truck operators and other users taking bulk water supplies from Power and Water's reticulation systems.

Power and Water is responsible for the installation, testing, verifying and maintenance for all meters at filling points. Meters are subject to the same testing requirements as customer meters set out in the Code. Locations of water filling stations are available on Power and Water's website.

5.7 Fire service meter assemblies

All fire services must be metered and appropriate backflow installed. The type and size of meter used is dependent on the type of fire service being installed and the Australian Standard design applicable to the installation. Responsibilities for a fire service meter assembly is as per Section 5.1 and Section 5.4. Power and Water is responsible for supplying and installing the meter/s.

6 Meter testing and verifying

The objective of Power and Water's meter testing and verifying program is to determine the accuracy of in-service meters and develop Power and Water's meter replacement programs.

Power and Water undertakes the meter testing program at no direct charge to the customer. Meter accuracy testing is undertaken in alignment with WSAA code of practice WSA 11 and AS 3565.4.

6.1 In-service meter accuracy testing

6.1.1 Mechanical meters

6.1.1.1 Small mechanical meters ($Q_3 \leq 16$ kL/h)

Small meters are defined by a permanent flowrate (referred as Q_3) of less than or equal to 16 kL/h.

Small mechanical meters are required to undergo accuracy testing within 3 years of being placed into service as per AS 3565.4. Power and Water adopts the 'six-flow' testing method in WSA 11, rather than the 'four-flow' testing method in AS 3565.4, to increase the accuracy of results.

The result of the 'six-flow' test is verified against the criteria in Table 1 and Table 2 to determine if the meter population can remain in service (i.e. criteria 1, 2 or 3) and when it should next be tested, or if it should be replaced (upper and lower error greater than 4%).

Table 1: In-service compliance criteria from WSA 11 ($Q_3 \leq 16$ kL/h)

DN20 - Criterion								
1			2			3		
Upper and lower error of sample	Compliance testing period		Upper and lower error of sample	Compliance testing period		Upper and lower error of sample	Compliance testing period	
	> 240 kL/yr	≤ 240 kL/yr		> 240 kL/yr	≤ 240 kL/yr		> 240 kL/yr	≤ 240 kL/yr
≤ ± 2.0%	1,920 kL	8 yrs	≤ ± 3.0%	1,440 kL	6 yrs	≤ ± 4.0%	960 kL	4 yrs

Table 2: In-service compliance criteria from WSA 11 (Q_3 ≤ 16 kL/h)

DN25 - Criterion								
1			2			3		
Upper and lower error of sample	Compliance testing period		Upper and lower error of sample	Compliance testing period		Upper and lower error of sample	Compliance testing period	
	> 800 kL/yr	≤ 800 kL/yr		> 800 kL/yr	≤ 800 kL/yr		> 800 kL/yr	≤ 800 kL/yr
≤ ± 2.0%	8,400 kL	8 yrs	≤ ± 3.0%	4,800 kL	6 yrs	≤ ± 4.0%	3,200 kL	4 yrs

6.1.1.2 Large mechanical meters (Q_3 >16 kL/h)

Large meters are defined by a permanent flowrate (referred as Q_3) of greater than 16 kL/h.

Cold water meters with a Q_3 > 16 kL/h are exempt from pattern approval and verification requirements of the *National Measurement Act 1960*. Power and Water has adopted volumetric throughput thresholds for large mechanical meters to maintain meter fleet accuracy within the prescribed limits of ±4%. Power and Water may also decide to replace the turbine mechanism of large mechanical meters and leave the original meter body in place, instead of a full meter replacement, where it is suitable/appropriate/acceptable to replace only that component of the meter.

Table 3 shows the replacement schedule Power and Water has adopted for larger mechanical meters.

Table 3: Large mechanical meter replacement schedule

Meter size (mm)	Through put replacement reading (kL)
40	40,000
50	250,000
80	400,000
100	600,000
150	1,000,000

Note: Replacement schedules may change due to metering improvements.

6.1.2 Solid state electronic meters

Solid state electronic meters such as electromagnetic, remnant magnetic field and ultrasonic are different to mechanical meters as there are no moving parts. Thus, solid state electronic meters are not subject to measurement error decay due to the wear and tear of mechanical components of mechanical meters. The current in-service requirements of AS 3565.4 and WSA 11 are not applicable as they relate to mechanical meters.

6.1.2.1 Small solid state electronic meters ($Q_3 \leq 16$ kL/h)

Small solid state electronic meter's replacement cycle will be dictated by the life of their internal battery. Small electronic meters generally have an integral internal battery with some manufacturers having replaceable batteries. A battery life of 15 years is commonly quoted, with the actual life primarily impacted by the amount of operational meter communication.

However, some electronic meters are susceptible to ad hoc random shifts in bias (e.g. systematic) errors which are detected as a trend change in water usage pattern. Some advanced solid state electronic meters overcome this problem by having an integral internal reference that continually checks and re-adjusts for any bias errors. Solid state electronic meters that do not have this self-checking capability shall be sampled by Power and Water according to the AS 3565.4 methodology and tested within 8 years of installation to ensure meter accuracy is maintained. Meters achieving an error of less than or equal to ± 4% (relative weighted error) will allow for the DN20 and DN25 meter population to remain installed for the remainder of its expected battery life.

6.1.2.2 Large solid state electronic meters ($Q_3 > 16$ kL/h)

Power and Water shall conduct typical routine maintenance for large solid state electronic meters detailed in Table 4.

Table 4: Large ($Q_3 > 16$ kL/h) solid state electromagnetic meter (EM) maintenance activities

Description	Comments
1. Routine Maintenance – Site inspections.	Annual frequency - unless manufacturer specifies more frequent. This includes servicing and calibration adjustments.
2. Routine Maintenance – Electronic fingerprinting, alarm diagnostics and drift analysis.	EM meters with electronic fingerprinting should be undertaken at time of purchase. Subsequent testing is to refer back to this initial fingerprint for comparisons. EM meters that do not have electronic fingerprinting capabilities are to be monitored for long term drift through analysis of flow data (e.g. expected mean and/or expected slope method).

Description	Comments
3. Routine Maintenance – Battery replacements.	Frequency - Internal and external batteries are typically replaced every 3-5 years. The timeframe is dependent on ambient temperature exposure.

If anomalies are identified, then the meter is to be removed and tested by Power and Water with the 'six- flow' as per WSA 11. Meters with an error greater than ± 4% (relative weighted error) are not to be re-installed after testing.

6.2 Customer requested meter tests

The customer can request an on-site volumetric comparison test and/or a NATA accredited test. Power and Water will respond within 10 business days to a customer request.

6.2.1 On-site volumetric comparison testing

This test involves measuring the flow through the customer meter with an in-line calibrated flow meter to compare the measured volume. Power and Water will undertake this test free-of-charge (for DN20 and DN25 meters only) at the request of a customer. The customer is encouraged to be on site for the testing.

Power and Water will replace the meter if it is ±4% in error against the calibrated meter.

6.2.2 NATA accredited testing

Power and Water will arrange for the customer's meter to be removed and replaced with a new meter. The removed meter will then be sent to an independent NATA accredited laboratory for testing.

The customer is responsible for paying for this test. The fee is refunded if the meter is proven to be over registering in excess of 4%.

7 Meter replacement

All meter replacements shall be undertaken by Power and Water or its approved contractor.

Meter replacement schedules will be in accordance with in-service compliance testing to AS 3565.4 outlined in Section 6.1. Where a population of meters are deemed to have failed compliance testing, the meters will be replaced in accordance with Power and Water's Water Meter Replacement Program.

Meters are also replaced in response to service requests received from customers in addition to meter replacement schedules on an ongoing basis. Meters identified onsite as failed in response to a service request will be replaced by Power and Water within a maximum of 28 days but will generally be replaced upon attendance to complete the service request.

Power and Water may elect to replace entire meter fleets for smaller centres where meter sampling is not cost effective.

Contact

Power and Water Corporation

Water Services

powerwater.com.au