



WATER METER STANDARD

June 2005

1. SCOPE

This document details the Department's Standard including the technical specifications and installation requirements for water meters. It also provides guidance on the key aspects of water meter selection, installation and maintenance.

This Standard and accompanying notes applies to water meters used to measure flow volumes and rates as required under Part 11 of the *Water Management Act 1999 (WMA)*.

Water meters shall meet the requirements of this specification at all times during their operation.

For the purpose of this document, the definitions below shall apply:

flow display unit means the part of the meter that displays the measurement results

'v' notch weir is a type of water meter that may be installed to specifically measure flows entering and leaving an instream dam. The technical requirements for a 'v' notch weir are to be discussed with and approved by an authorised officer of the Department.

water meter (a "meter") means a device that is constructed for, or that may be adapted for measuring the flow of water. The device must be able to measure and display the cumulative flow volume and allow for readings to be taken to determine the instantaneous flow rate of water passing through a pipeline.

2. TECHNICAL REQUIREMENTS

2.1 Meter Design and Construction

All meters **must** conform to the following technical specifications:

Accuracy limits

The meter must be capable of meeting a standard of accuracy of $\pm 2\%$ (as supplied) of actual flow over the expected range of the water pipeline system. This standard is to be met operating in either a horizontal or inclined pipeline system.

The meter manufacturer must warrant that the new meter will meet this accuracy standard. The owner must maintain the stated accuracy of their meter by replacing the wearing components as required; depending on the manufacturer's requirements and the amount and quality of water pumped through the meter.

Flow display unit

The meter is to include an integrated flow display unit for the display of flow data. The flow display unit must be resistant to corrosion and fogging. The flow display unit must be of a size and type that is easy to read with clearly specified units and must indicate and/or enable a determination of the following parameters to be made:

- Cumulative flow totaliser able to be expressed in megalitres (ML) with a minimum of a six digit display, and
- Instantaneous flow rate able to be expressed in litres/second (l/s).

Output requirements

The meter must have the capability for easy conversion to provide an electronic output (eg pulse or analogue signal) suitable for sending to ancillary equipment such as a remote data logger.

Water quality

The meter must be able to operate accurately where water contains suspended solids and/ or entrained air.

Flow direction

The meter must be labelled so as to show the direction of flow, orientation and any other necessary installation information to achieve the required accuracy. The flow volume totalised must be unaffected by flow in the opposite direction to the labelled flow direction.

Serial number

The meter must have a clearly identifiable manufacturer's serial number securely attached to or imprinted on the meter, and is to be located in a position that is easily visible when taking manual readings from the meter display unit.

Security

The meter must be tamper proof and include protection devices that prevent and/or indicate tampering of the meter.

Testing/ certification

The meter must be an irrigation type meter supplied from a manufacturer compliant with Australian Standard/ New Zealand Standard (AS/NZS) 9001 – Quality Management Systems. The type of meter must have been tested in a flow rig utilising a reference flow meter traceable to an accredited laboratory.

Element protection

The measuring mechanism of the meter must be protected to at least IP68 in accordance with AS1939 (IP Code).

Users guide including installation manual

The meter must be supplied with a User's Guide and Installation Manual. The Guide is to detail the installation requirements to achieve the stated accuracy, and provide a diagram of the configuration of the pipe work and meter to meet this accuracy.

Materials

The meter must be manufactured from sound, durable, corrosion resistant materials. Where materials are coated, the coating shall be in accordance with AS4158. All parts of the meter in contact with water must be manufactured from materials that are non-toxic, non-reactionary and biologically inert.

Maintenance

The meter must be designed for easy and quick maintenance and cleaning and should be of a type that incorporates a self-cleaning mechanism.

2.2 Installation

The meter **must** be installed in accordance with the manufacturer's specifications.

Subject to the manufacturer's installation requirements, the following points should also be adhered to:

- Meters are to be located as close as practical to the point of extraction
- To reduce interference it is preferable that the meter is mounted on the discharge side of the pump and located within a weatherproof enclosure (ie pump house). Note: DPIWE approval is required prior to installing a meter on the intake side.
- The measuring mechanism of the meter must be located in straight clean pipe of uniform, circular cross section and without any fittings or obstructions. In all cases the meter must be installed so that at all flow rates there is a full pipe of water immediately upstream and downstream of the meter.
- Subject to any specific installation requirements, a minimum of ten (10) diameters of straight pipe¹ must be fitted immediately upstream of the meter, and a minimum of five (5) diameters of straight pipe¹ immediately downstream of the meter to minimise flow disturbance. Where this requirement cannot be met, it may be acceptable (subject to DPIWE approval) for the meter to be installed with a minimum of five (5) diameters of straight pipe¹ upstream of the meter and a minimum of two (2) diameters¹ immediately downstream.
- It is recommended that a "loose" ring or expansion joint is installed into the pipe work following the minimum lengths of straight pipe downstream of the meter to provide for easy meter servicing.
- Where the meter is to be fitted to plastic or polyethylene pipelines, it is to be supported by concrete thrust block or fabricated steel bracing.
- The meter is to be fitted between the pump and a check valve, if fitted, and downstream of any filtering equipment.
- The meter should not be installed in a section of pipe where there may be air pockets or the pipe does not run full of water. If it is likely that air will become entrapped near the meter, an air valve will be required to be installed.
- The meter must be accessible at all times. The meter should be mounted in a way that allows easy access and viewing of the counter display in the right plane. Horizontal mounting is preferred for best access to the counter.
- Install the meter in the right direction to the flow. Ensure the meter is located to allow easy readability of the serial number when taking manual readings from the meter display unit.
- No meter shall be installed deeper than 1.5 meters below ground level. Where a meter is installed underground, sufficient space shall be provided to facilitate easy access for maintenance and reading.
- The licensee shall demonstrate with the installation and housing of the meter, due diligence in meeting their responsibilities as defined under the *Workplace Health and Safety Act 1995* and any relevant Regulations drafted under that Act, in relation to persons who may in their work: i) safeguard, site, install, test, alter, repair, maintain or dismantle any plant; or ii) work in an isolated or remote area. For example, meters located on riverbanks or steep slopes shall be provided with suitable access and safety facilities (eg handrails).

¹ All references to "x diameters of straight pipe" refer to a straight length of pipe that has the same internal diameter as the internal diameter of the meter and equivalent in length to at least x times the diameter

2.3 Recording and reporting data

The following standard conditions stipulate the recording and reporting requirements for water meters that must be adhered to, where the installation of a water meter has been made a condition of a water licence.

Standard water meter conditions for all water licences

1. The licensee must immediately report any fault or suspected fault in a meter to an authorised officer.
2. The licensee must not cause, suffer or permit the interference with a meter used for the purposes of measuring the quantity of water used under the *Water Management Act 1999* or any interference with pipes or fittings that may affect the accuracy of a meter, without the Minister's or Delegate of the Minister's authority.
3. The licensee must not damage or destroy a meter
4. Within five (5) days of installing a meter required by condition of a water licence, or reinstalling or replacement of a meter, the licensee must complete the Department's "Water Meter Certification Form" and submit it to the Department.
5. A weekly record of water quantities taken from the water resources (including any dams) listed on the licence must be maintained in a format prescribed by the Department. This information must be forwarded to the Manager, Water Management Branch, DPIWE, GPO Box 44, Hobart, 7001 by 30 June each year, or as otherwise determined by the Department.
6. The weekly record at condition (5) must be made available for inspection at the request of an authorised officer
7. Notwithstanding condition (5), during water restrictions, meter readings are to be read and recorded daily from the start of each restriction period; and provided to the Department at the end of each week of restriction, or as otherwise determined by the Department.
8. The daily record at condition (7) must be made available for inspection at the request of an authorised officer.

3. NOTES

There are several additional considerations when purchasing a water meter. These notes address a number of the major issues and should be read and used in conjunction with the Department's Technical Requirements for water meters.

Pressure

Meters must be of robust construction and able to withstand the normal operating range of pressure in the pipe system with allowance for water hammer caused by pump shutdown etc. Pressure rating up to 140 meters head (1400 kpa) will be sufficient for most irrigation pump installations.

Power supply

Mechanical meters, which have been traditionally used, do not generally require a power source. New types of meter have become available that use electromagnetic or ultrasonic technology to measure water flow. These meters perform very well but require a power source and are usually more expensive than the comparable size mechanical flow meters. Where a meter installed relies in any way on an electrical power source, then it shall have a non-volatile memory to ensure that recorded data is not lost in the event of a power or battery failure.

Connections

The flanged type meter body is usually the easiest type to fit and should be bolted into the pipeline using at least one slip flange (uniflange) connection. The slip flange will allow you to tighten up both flange connections within an otherwise rigid section of pipe and obtain a watertight seal at the rubber gaskets. Where flanges are required it is recommended that the flanged pieces be flanged to requirements AS 2129.

Flow display unit

There are two main types of flow display unit: the sweep hand dial and the digital display. If considering purchasing a model with the sweep hand dial, it is recommended that you check the following; can you easily read the counter and convert the readings, is a conversion table provided to calculate instantaneous rate of flow and what else is required to take measurements (eg stop clock).

Flow calculation method

The following provides a quick method to calculate flows using a sweep hand dial flow display unit: to calculate flows being traversed through the meter, use the second hand on your watch to time the movement of the pointer on the meter. For common meter types (see manufacture specifications) one revolution of this pointer indicates that 1000 litres has flowed through the meter. Divide 1000 by the number of seconds for one revolution and you have the pump flow in litres per second (l/s). Daily pump extraction in megalitres can be calculated by multiplying flow rate (l/s) by 0.0864 and equals daily extraction, megalitres per day (ML/day).

Water quality

Meter accuracy and lifespan can be impacted upon greatly by water quality. It is strongly recommended that a foot valve with a strainer or coarse sieve be fitted to the pump intake line, as leaves and sticks may be pumped through the pipelines in the system. These contaminants may damage or affect the accuracy of any mechanical meter fitted in the pipeline.

The Woltman turbine (vane type) meter is particularly prone to damage and should not be used unless an in-line filter is installed upstream of the meter. The other types of mechanical meters available use helical rotor or paddle wheel components; these meters do not normally require an in-line filter to perform satisfactorily.

Additional considerations

You may also wish to consider the following issues prior to purchasing a meter:

- Requirements of any existing infrastructure – capabilities and pressures etc
- Cost of servicing, parts and maintenance
- Warranty period and back-up service support
- Ability to self maintain/ service

It is strongly recommended that you consult with your Regional Water Management Officer and/or local meter supplier to discuss your specific needs and to ensure conformance with the Department's technical requirements prior to the purchase and installation of your meter.

Recording and reporting data

Water meter flow records are to be kept in a waterproof logbook in close proximity to the meter. It is good practice to measure and record all amounts of water extracted daily. Meters and logbooks are to be made available to an authorised officer for inspection at any reasonable time.

4. FURTHER INFORMATION

If you have any questions in relation to the Department's Standard or the operation of your meter, please contact your local Regional Water Management Officer.

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