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## KERALA WATER AUTHORITY

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Kerala

### PROCEEDINGS OF THE MANAGING DIRECTOR

**PRESENT : Sri Venkatesapathy S. IAS**

Sub:- Kerala Water Authority - Implementation of Meter Policy - Reg.

No: 4461/AE II(OP)/2020/KWA

Dated: 15.03.2021

*Read:-* 1) Resolution No. 11129 of the 419th meeting of KWA held on 23/02/2021.  
2) Proceedings No. 4461/AE II(OP)/2020/KWA dated 26/08/2020 of the Technical Member, KWA.  
2) 415th meeting of KWA held on 21/07/2020.

As per the decision taken in the 415th meeting of KWA held on 21/07/2020, a committee has been constituted vide proceedings read 2 above of the Technical Member with CE (P&O). Chief Law Officer, KWA, DCE Monitoring, SE, PHC Kollam, EE, Operations and Technical expert from FCRI, Palakkad as Committee members to formulate a strategy to address issues related to inconsistent or inaccurate water meter readings, so as to reduce the NRW.

It has been decided that the committee shall draft a water meter policy for KWA for the connection to, and management of, all water meter installation requirements applies to domestic and non domestic (including industrial and casual) connections and which will address issues related to inconsistent of inaccurate water meter readings. Accordingly draft meter policy with specification, selection, testing, installation is prepared and placed in the Technical Committee formed for this purpose on 03/11/2020. The suggestions and recommendations of the committee members were incorporated and draft meter policy placed before the Authority for approval.

The Authority in its 419th meeting held of 23/02/2021, discussed the matter in detail and



resolved to approve the draft meter policy (vide resolution 11129), which has encompassing provision for reducing NRW by assuring quality, testing and replacement of water meter in KWA. The approved meter policy is attached herewith for strict compliance.

*Sd/-*

Venkatesapathy S. IAS  
Managing Director

To

CE(SR,CR,NR,PPD&WASCON,HRD&GL, P&O), FM&CAO,CLO, All SE's, EE's

Copy To

EE to MD,PA to AM, AE to TM, AE IT





## KERALA WATER AUTHORITY

### Meter Policy



#### **Kerala Water Authority**

[Selection, Testing, Installation and Replacement]

#### OPERATIONS

This document contains Kerala Water Authority's policy for the connection to, and management of, all water meter installation requirements applies to domestic and non domestic (including industrial and casual) connections.

The document is digitally approved. Hence signature is not needed.



## **Introduction**

This document contains Kerala Water Authority's policy for the connection to, and management of, all water meter installation requirements applies to domestic and non domestic ( including special causal connection and industrial connections) house connections.

Kerala Water Authority may change or replace any part of this Metering Policy at any time. The latest version of this Metering Policy can be obtained by downloading a copy from our website [www.kwa.kerala.gov.in](http://www.kwa.kerala.gov.in). Any changes to this Metering Policy will operate prospectively and not retrospectively.

## **Meter Policy Objectives**

The objectives of the Water Meter Policy are:

1. To provide fair equity for the KWA Customers
2. To encourage best practice
3. To ensure consistent approach to metering solutions.

## **Provisions in KWA Act and Regulations**

The provisions in Kerala Water Supply & Sewerage Act, 1986 ( Latest amendment in 2008) and Kerala Water Authority ( Water Supply) Regulations, 1991 ( Latest amendment in 1998) pertaining to standard of water meters is reproduced below for review.

### **1. Kerala Water Supply & Sewerage Act, 1986 - Chapter VI- Section 42**

Provision of water meters.—

- (1) The consumer shall provide a water meter and attach the same to the service, pipes in his premises connected with the water works of the Authority after obtaining approval from the Authority.
- (2) The consumer shall repair or replace water meters installed in his premises, at his own cost whenever required to do so by the Authority.
- (3) Notwithstanding anything contained in sub-section (1), the Authority shall have the power to install its own water meters to any connection wherever the Authority deems fit.
- (4) The provision of water meters and the transfer of connection thereto, the use, maintenance and testing of such meters and the expense of installation thereof and their rents and the furnishing of security, if any, in connection therewith shall be regulated by regulations.

### **2. Kerala Water Authority ( Water Supply) Regulations,1991 – Regulation 12**

Installation of water meter and stop cock.—

- a) Every premises to which water is supplied, shall be provided with a separate house connection,



separate stop cock and separate meter attached to the connection pipe.

(b) In the case of all types of connection, the meter at the premises shall be provided by the consumer. Where, however, the meter has already been provided by the Authority, the hire charges for such meters shall be Rs. 10 per month.

(c ) The meter installed as provided in clause (a)] shall have Bureau of Indian Standards Certification Marks and approved by the Authority and having a test certificate issued by the Assistant Executive Engineer regarding the accuracy of the meter. Meter shall be procured by the applicant and produced before the Assistant Executive Engineer for inspection and installation at site.

(d) Every meter shall be provided with a meter box and cover, of a type approved by the Authority made of good weather resistant and strong material like steel, cement concrete or HDPE, by the owner or occupier of the premises. The meter shall be placed above ground level, wherever practicable, in such a manner as to be easily read, repaired or serviced.

### **Indian and International Standards**

- IS 779: 1994 (Reaffirmed 2015) - SPECIFICATION FOR WATER METERS (DOMESTIC TYPE)
- IS 2373: 1981 (Reaffirmed 2017)- SPECIFICATION FOR. WATER METERS (BULK TYPE)
- IS 2401: 1973 - CODE OF PRACTICE FOR SELECTION, INSTALLATION AND MAINTENANCE OF DOMESTIC WATER METERS
- IS 6784:1996 – METHOD OF PERFORMANCE TESTING OF WATER METERS
- ISO 4064-1:2014 – WATER METERS FOR COLD POTABLE WATER AND HOT WATER – METROLOGICAL AND TECHNICAL REQUIREMENTS
- ISO 4064-2:2014 – WATER METERS FOR COLD POTABLE WATER AND HOT WATER – TEST METHODS

Water meter (domestic) is an instrument covered in the Seventh Schedule of Legal Metrology (General) Rules,2011 and as per Rule 13 of the Legal Metrology (General) Rules, 2011 shall conform, as regards physical characteristics, configuration, constructional details, materials, performance, tolerances and such other details, to the corresponding specifications laid down for such measuring instrument in Eight Schedule. The Legal Metrology (Government Approved test Centre) Rules, 2013 prescribes that water meters shall be verified by Govt. Approved Test Centres in addition to verification done by the State Government Officers of Legal Metrology. The International Organization of Legal Metrology (OIML) has even published separate Regulations for water meters as Weights and Measures ( Metrological Control of Water Meters) Regulations,2014.

### **Sizing of Water Meters**

The nominal sizes of domestic water meters are varying from 15 mm to 50 mm as per {IS 779: 1994 (Reaffirmed 2015)} and bulk water meter is varying between 50 mm & above as per {IS 2373: 1981 (Reaffirmed 2017)}. ISO 4064:1993/ISO 4064:2014, Range of operation (flow rate) is specified for each water meter. Water meters should be selected based on the flow rate range expected at the location of installation. It is not depended on the adjoining pipe size. In general, main considerations are as follows:





amendments.

For other domestic water meters ( 40/50mm) either mechanical or electromagnetic or ultrasonic meters can be used depending on the location, ease of installation and the sensitivity to flow disturbances. In any case such meters shall be capable of remote reading or AMR compatible. Relevant ISO standards (ISO 4064) may be followed for such meters

For bulk meters electromagnetic or ultrasonic meters with AMR facility conforming to ISO 4064 alone shall be used.

The water meters shall be approved by FCRI either through Model Approval Program (meter supplied by qualified suppliers published by FCRI ) or having FCRI type test & life cycle test certificate not older than 1.5 years

The water meter and accessories shall be manufactured from materials of adequate strength and durability meeting the specifications for the material of construction of the individual parts of the meters as per IS 779:1994 (latest amendments) or ISO 4064: 1993. . The materials, which come in contact with the potable water, shall not create a toxic hazard, shall not support microbial growth, and shall not give rise to unpleasant taste or discoloration in the water supply. The meters shall be supplied complete with brass nuts and brass nipples, strainer & sealing.

The water meter manufacturer must possess quality management certificates pertinent to ISO 9001:2008, ISO 14007:2004

### ***Water Meter Reading***

A standard water meter uses two common types of registers - straight and circular - to read the flow of water in cubic feet or inches. The registers can be observed on the surface of the meter. The straight registers can be read like an odometer in a car. On some larger meters, a multiplier will be present on the register face, which can be noted as 10X, 100X, or 1000X based on the size of the meter. Circular registers, on the other hand, are more complex to calculate water usage. They employ a series of dials marked with divisions of ten.

There are several ways of reading the water meter, which includes:

- Direct reading
- Remote reading, which is accomplished via an electronic signal using a wire where one can either directly read or touch read.
- Touch read or plug-in reading that employs a handheld device which acquires the electronic signal by touching the remote station or plugging-in. The signal is then translated into the readings that are stored in the handheld device.
- Automatic meter reading, in which the meter reader obtains readings through radio transmission.

For reading meters of domestic connection, the following procedure shall be followed.

- There will be an option to read the meter by the consumer himself ( self reading) on a monthly basis. The consumer has to register for this service using the mobile number and the meter reading can be uploaded to the billing software once in a month. There will be OTP verification for authenticity. Provision for uploading the image of the water meter along with GPS location will also be made available.
- KWA staff will be taking the water meter readings once in every six months. If any discrepancy is noted in the monthly consumption as against the consumption recorded based



on self reading adjustment bills for the amount along with necessary surcharges will be levied from the consumer. If any not working water meter is reported as working during self reading, the bills already issued will be reassessed based on probable consumption during the period based on a previous average

### ***Position of Water meter in a connection***

Unless otherwise approved in writing, KWA requires meters to be within the property and accessible, positioned within 2 metres of the property boundary, being directly opposite to the connection and at right angles to the reticulation water main (in line with the tapping). Unless otherwise approved in writing, KWA requires all water meters to be positioned within the property boundary, not inside the building. External recessed areas within the shop front or rear are acceptable provided that the meter and service is not imbedded in concrete or in driveways, and is accessible and clear of obstructions to enable unfettered access for reading, testing, inspection, maintenance and exchange at all times. The meter assembly shall be located and protected to avoid damage and vandalism. Meters and pipe work are not to be imbedded in or under brick fences or pillars. Under no circumstances, the water meter dial shall be below 50 cm from the normal ground level in the premise.

### ***Installation of Water Meter***

Installation is the first step in a meter's service life, and is important to do correctly. Meters that are not installed in accordance with good practice and manufacturer specifications are bound to have shorter service lives and higher levels of under-registration. Only licensed plumbers or persons authorised by KWA in the course of their duty shall carry out any work for the installation of any meter. If a water meter is placed in a meter pit for any reason, the pit and the maintenance of the pit is, and will remain the responsibility of the property owner whether it is within the property boundary or not. The meter, meter fittings and stop valves within the pit must be installed to allow easy access for maintenance, if maintenance cannot be performed due to the nature of the pit or meter installation the owner will be directed in writing to remedy the problem.

If a property owner has a need to offset the meter within the property boundary the offset will be limited to one (1) meter. If a meter or meter installation is found imbedded in concrete, the owner or occupier will be asked to remove the concrete from around the meter installation. Should the owner or occupier wish to install concrete "mower strip" around the water meter, then the concrete should only surround (not encase) the vertical risers of the meter assembly where they enter the ground.

Placing plastic or UPVC sleeves around the vertical rises before the concrete is poured will enable the meter to be exchanged without the need to remove the concrete. The horizontal pipes and the body of the meter must be left clear of concrete at all times. The meter shall be installed so that the flow through the meter shall be in the correct direction as indicated by an arrow on the meter. The orientation of the pipe work shall be correct and the orientation of the meter in the pipe shall be upright.

Minimum straight lengths of pipe as specified by the IS shall be available directly upstream and downstream of the meter. The straight sections of pipe should be installed directly to the meter and no reducers, valves or anything else should be installed between the meter and the straight pipe sections. Isolating valves should be installed on both the upstream and downstream side of the meter. Meters using electricity need protection against lightning and electrical surges.

Large water meters often have additional installation requirements, such as: allowance for in-situ

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testing of the meter, flexible couplings to allow the meter to be easily removed, necessary protection from shocks, vibrations and water hammer. Where a meter is installed in plastic pipes, it should be supported by concrete thrust blocks to prevent excessive pipe movements that can damage the pipe. Care should be taken that flange gaskets do not protrude into the pipe.

In cases where fire lines or hydrants are required on a property, it is recommended that the connection to the fire line is made downstream of the meter. After the installation has been completed, it is recommended that the water is opened gradually to ensure that air is expelled slowly – a meter can suffer damage if subjected to high air flows. The following actions should be taken after each meter installation: The installation must be pressure tested to ensure that there are no leaks and that the meter is operating correctly. Where loggers or electronic flow reading and transmission equipment are used, the data recorded should be verified against the actual meter reading. The following guidelines should be borne in mind while installing the meters.

- (i) The water meter being a delicate instrument shall be handled with great care. Rough handling including jerks or fall is likely to damage it and affects its accuracy;
- (ii) The meter shall be installed at a spot where it is readily accessible. To avoid damages and overrun of the meter due to intermittent water supply system, it is always advisable to install the meter, so that the top of the meter is below the level of the communication pipes so that meters always contains water, when there is no supply in the line. Also, the minimum straight length condition as per the drawing shall be observed;
- (iii) The meter shall preferably be housed in a chamber with the lid for protection; it should never be buried underground nor installed in the open nor under a water tap so that water may not directly fall on the meter. It should be installed inside inspection pits, built out of bricks or concrete, and covered with the lid. It should not be suspended;
- (iv) The meter shall be installed so that the longitudinal axis is horizontal the flow of water should be in the direction shown by the arrow cast on the body;
- (v) Before connecting the meter to the water pipe, it should be thoroughly cleaned by installing in the place of the water meter a pipe of suitable length and diameter and letting the passage of a fair amount of water flow through the pipework to avoid the formation of air pockets. It is advisable that the level of the pipeline where the meter is proposed to be installed should be checked by a spirit level;
- (vi) Before fitting the meter to the pipeline check the unions nuts in the tail pieces and then insert the washers. Thereafter screw the tail pieces on the pipes and install the meter in between the nuts by screwing. To avoid its rotation during the operation, the meter should be kept fixed with suitable non-metallic clamps. Care should be taken that the washer does not obstruct the inlet and outlet flow of water;
- (vii) The protective lid should normally be kept closed and should be opened only for reading the dial;
- (viii) The meter shall not run with free discharge to the atmosphere. Some resistance should be given in the downside of the meter if static pressure on the main exceeds 10 m head;
- (ix) A meter shall be located where it is not liable to get the severe shock of water hammer which might break the system of the meter;
- (x) Owing to the fine clearance in the working parts of the meters they are not suitable for measuring water containing sand or similar foreign matter and in such cases a filter or dirt box of the adequate effective area shall be fitted on the upstream side of the meter. It should be noted that the normal strainer fitted inside a meter is not a filter and does not prevent the entry of small particles, such as sand;



- (xi) Where intermittent supply is likely to be encountered the meter may be provided with a suitable air valve before the meter in order to reduce inaccuracy and to protect the meter from being damaged. At higher altitude, if the meter is installed as above, the problem will be eliminated;
- (xii) Every user expects a problem-free installation of the meter and thereafter only accurate reading. Regular monitoring is desirable in order to avoid failures;
- (xiii) The meter is installed in the pipeline using flanged or threaded connections giving due consideration for conditioning sections. It should be seen that stress-free installation is carried out in the pipeline;
- (xiv) It is essential to install the flowmeter co-axially to the pipeline without protruding any packing or gasket into the water flow stream. In the case of ultrasonic meter, the probes are welded on the pipeline which requires care to see that no projection is protruding in the pipeline;
- (xv) Installation in 'U' shape is essential for intermittent water supply;
- (xvi) Flow meters should be provided with battery backup in order to retain integrator reading during the failure of electric supply.

**Removal of Water Meter**

No person other than licensed plumber duly authorized by KWA, persons authorised by KWA or departmental staff engaged for the purpose shall remove a water meter fixed on a house connection.

**Meter Testing**

Meter testing is classified in to two

1. Testing of New Water Meters Before installation

Only those meters that has been approved by FCRI either through Model Approval Program (meter supplied by qualified suppliers published by FCRI ) or having FCRI type test & life cycle test certificate not older than 1.5 years can be used in all house connections. In cases where water meters are purchased in bulk by KWA and provided to consumers on cost recovery basis, or to be supplied to consumers through open market, the manufacturer or retailer who intends to supply the water meter shall make available the water meters in suitable batches of size not less than 50 Nos. at the disposal of AEE for verification and further acceptance test. Such meters shall be subjected to the following selection criteria and testing

The AEE shall select random samples from the supplied lot strictly as per the sample size specified for acceptance testing in IS 779 and carryout the acceptance test in FCRI. The sample size, criteria for acceptance and procedure for acceptance is reproduced below for reference

1	2	3	4	5	6	7
Size of Lot	Size of First Sample	Acceptance No.	Rejection No	Size of Second sample	Size of Cumulative Sample	Cumulative Acceptance No.
Up to 50	5	0	1			
51-150	13	0	2	13	26	1
151-280	20	0	3	20	40	3
281-500	32	1	3	32	64	4



<b>501-1200</b>	50	2	5	50	100	6
<b>1201-3200</b>	80	3	6	80	160	9
<b>3201-10000</b>	125	5	9	125	250	12
<b>100001-35000</b>	200	7	11	200	400	18
<b>&gt;350001</b>	315	11	16	315	630	26

The samples of water meters from a lot shall be selected at random or by random selection. The procedure for simple random sampling or systematic sampling as given in IS 4905: 1968 may be adopted. The first sample size of water meters from a lot shall be selected in accordance with column 1 and 2 of the Table. Each meter in the sample shall be subjected to acceptance test.

If in the first sample, the number of defective meters is less than or equal to the corresponding acceptance number as given in column 3 of Table, the lot shall be declared as passing the acceptance tests. If the number of defective meters is greater than or equal to the corresponding rejection number as given in column 4 of Table, the lot shall be declared as not passing the acceptance tests. If the number of defectives is greater than the acceptance number but less than the rejection number, the second sample of size equal to that of the first sample shall be taken and subjected to acceptance tests. The number of defective meters found in the first and the second sample shall be added and if the cumulative number of defectives thus obtained are less than or equal to the acceptance number as given in Column 7 of Table, the lot shall be declared as passing the acceptance tests, otherwise it shall be rejected tests. Any sample of water meter failing in anyone or more of the acceptance tests shall be considered as a defective for the purpose.

The testing at FCRI shall include following tests as per IS-779 and IS 6784 or ISO 4064 standards.

1. Pressure tightness
2. Loss of pressure
3. Metering accuracy
4. Minimum starting flow

For water meters whose batch has been selected from the above process, the AEE shall issue a certificate based on the test done by FCRI for all water meters in that batch. The certificate so issued to be attached to every water meter supplied to KWA or to retail outlets for sale. Only those water meters with a valid test certificate can be used for providing house connection.

## 2) Testing of Water Meters Already Installed

Like any mechanical device, water meters deteriorate with use and generally under register as they age. The starting flows and accuracy at low flows are the areas on the accuracy curve that tend to deteriorate most rapidly. A simple way to test the accuracy of domestic meters is to connect the master meter to a tap on the property and control the flow rate through both meters using the tap. It is important to ensure that other fixtures are not used during the test, and to note that any on-site leakage will not be measured by the master meter. Any master meter used to test the accuracy of a meter should be substantially more accurate than the meter being tested.

However, it doesn't make sense to try to test all domestic and small meters due to the large numbers of meters in the system and small volumes involved. The recommended approach to



domestic and small meter testing is to first group the meters by factors such as meter model, size, age, volume measured and user type, and then selects a number of meters in each group to test.

### ***Operation and Maintenance***

Operation and Maintenance is important to ensure that meters operate efficiently for the longest possible time. Accuracy of Meters don't last forever and thus have to be tested at regular intervals and replaced if necessary. Without these tests it is impossible to know the actual performance of meters in the system. Analysis of meter accuracy and other data in the meter management database forms the basis for rational decision-making on meter replacement, service and selection. Developing a fully operational meter management system can be a daunting task, and it may not be possible to implement it all at once. All meter types require monthly and annual inspections. Monthly inspections address operational observations such as leakage, noise, and vibration.

### ***Reading Water Meters***

Water meters are always read in the same direction as reading a book, i.e. from left to right. By law, all meters have to measure in m<sup>3</sup> (i.e. kilolitres), and must clearly distinguish between full m<sup>3</sup> values and fractions of a m<sup>3</sup>. In most of the meters this is done using contrasting colours; typically white numbers on a black background for full m<sup>3</sup> values and white numbers on a red background for fractions of a m<sup>3</sup>. Meter readers should be precise and not suffer from any reading impairments. Proper training of meter readers is very important. When reading, both the meter serial number and indicator reading should be taken to ensure the reading is allocated to the correct meter. It is also important that meter readers should be trained to identify and report problems with meters, such as signs of tampering, damage to meter boxes and leakage. Meter readers should be provided with the correct tools, and properly trained on safety measures when reading meters. Injury can result from opening manhole covers without the proper tools and dangerous animals (such as snakes or bees) may potentially hide inside meter boxes.

### ***Replacement of Water Meter***

At present the water meters are replaced by the consumers as and when it is reported to be not working by KWA. A typical policy for replacement taking into account the preventive maintenance aspect is to replace the water meter every 7th year irrespective of the fact that the water meter is working or not. In addition to the water meters that are replaced for not working properly, those water meters which have completed 7 years of life shall be replaced by the consumer even if they are working. KWA shall serve a notice to the consumer in such cases and the consumer to replace the water meter at his own cost. If the consumer is not willing to replace the water meter, the replacement shall be done by KWA with cost to the consumer.

