

Notification of the Ministry of Commerce

Regarding Prescription of Type and Characteristic of Water Meter, Detail of Materials Used for Manufacture, Maximum Permissible Error

By virtue of Section 5, paragraph two of Section 8, Section 16 and Section 26 of the Measurement Act, B.E. 2542 (1999), as amended by the Measurement Act (No. 3), B.E. 2557 (2014), the Minister of Commerce, upon the recommendation of the Weights and Measures Committee, has therefore issued this Notification, as follows.

Article 1. This Notification shall come into force upon the expiration of ninety days from the date of its publication in the Government Gazette.¹

Article 2. In this Notification:

“Water Measurement System” means the system comprising the water meter, the ancillary device and the associated device;

“Ancillary Device” means the device which is used to perform a particular function for being directly involved in measurement results, e.g. the zero setting device, the printing device, the price indicating device, the overall result indicating device, the conversion device, or the pre-setting device;

“Associated Device” means the part or the device apart from the ancillary device which is necessary to be used to enhance confidence in measurement results correctly, or is intended to help operate the measurement conveniently, or is the device affecting accuracy in the measurement, e.g., a steam cleaner, a filter, a pump, a valve, or a pipe;

“Zero Setting Device” means the part which is used to set the meter to display the zero value;

“Indicating Device” means the part of the meter which is used to display the value of material volume as measured;

“Scale Mark” means the scale or other sign on the indicating device which is used to indicate the value of volume as measured;

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“Principal Scale Mark” means the value which is displayed as the unit of the volume of difference between the value of two consecutive scales, in the case of the display of value for analog indication, or the difference between two consecutive values as displayed, in the case of the display of value for digital indication;

“Scale Interval” means the distance between two consecutive scale marks by measuring along the middle of the smallest scale mark;

“Minimum Measured Quantity : MMQ” means the minimum volume which the water measurement system can measure accurately;

“Minimum Specified Quantity Deviation : E_{\min} ” means the maximum permissible error for the measurement of the minimum measured quantity;

“Flowrate : Q ” means the volume of water passing through the meter and the time taken for this volume to pass through the meter;

“Minimum Flowrate : Q_1 ” means the lowest flowrate at which the meter can operate, by the deviation of the meter not exceeding the maximum permissible error as specified;

“Transitional Flowrate : Q_2 ” means the value of flowrate which divides the flowrate into two zones, the lower flowrate zone and the upper flowrate zone, and is a spot to change the value of the maximum permissible error as specified according to each flowrate zone;

“Permanent Flowrate : Q_3 ” means the highest flowrate at which the meter can operate without damaging the meter, and the deviation of the measurement of the meter not exceeding the maximum permissible error as specified;

“Overload Flowrate : Q_4 ” means the highest flowrate at which the meter can operate without damaging the meter, and the deviation of the meter not exceeding the maximum permissible error as specified within a period of time, being higher than the permanent flowrate;

“Specified Flowrate” means the flowrate at which the meter can normally operate in a continuous manner and a discontinuous manner, by the deviation of the meter not exceeding the maximum permissible error as specified, and the flowrate is expressed as 0.5 times of the permanent flowrate;

“Lower Flowrate Zone” means the zone of flowrate which is lower than the transitional flowrate up to the zone of minimum flowrate;

“Upper Flowrate Zone” means the zone of flowrate which starts from the transitional flowrate up to the overload flowrate;

“Maximum Permissible Error : MPE” means the value of the extreme deviation of the meter as permitted.

Title 1

Water Meter Being Subject to Measurement Act, B.E. 2542 (1999),
as Amended by Measurement Act (No. 3), B.E. 2557 (2014)

Article 3. The water meter which is the measurement of water volume for continuous consumption through a pipe system and displays the measurement result continuously, whereby the entrance temperature of the water meter has values starting from 0.1 not exceeding 50 degree Celsius, shall be the water meter being subject to the Measurement Act, B.E. 2542 (1999), as amended by the Measurement Act (No.3), B.E. 2557 (2014).

The water meter is the instrument which is designed to measure and supply water by volume and has the indicating device to display the measurement result.

Title 2

Characteristic, Detail of Materials Used for Manufacture, Maximum Permissible Error

Chapter 1

General Provisions

Article 4. The water meter which is used in purchasing – selling or exchanging goods with other persons, or providing the service of measurement or using the meter for the benefit of calculating considerations, taxes and fees, shall have the feature as specified in this Notification.

In the case of any person who wishes to produce or import the meter, the feature of which differs from that as specified in this Notification, the meter shall be examined by the Central Bureau. If the result of examination appears that the standard feature of the aforesaid meter does not differ that as specified in this Notification and the meter is

approved by the Minister of Commerce, a competent official is required to grant verification for the aforesaid meter.

Article 5. The water meter shall be produced permanently. In addition, it shall not be simply used as a tool of fraud.

The water meter shall be produced from good materials. In addition, it shall be designed and produced in a manner that when it is used as usual, it can always operate accurately. The components of the meter can operate continuously without defect, bend or deformation which affects the accuracy of the meter. In the case of adjusting the meter, the adjusted meter is required to maintain the condition of accuracy appropriately.

In the case of necessity, the Central Bureau may test the prototype of the meter in accordance with rules, procedures and conditions as stipulated by the Minister, upon the recommendation of the Committee.

Article 6. The water meter shall display the following details on the instrument. Such details shall be easily read, clearly and indelibly.

- (1) a name or a trademark of a producer, an importer or a seller,
- (2) a model which is specified the form of an instrument,
- (3) a series number of an instrument which is specified by a competent official.

The provision under paragraph one shall not be applied to the component which is separated from the meter and necessary to the measurement including not affecting the accuracy of the measurement, or the meter which cannot display the aforesaid details because of the state of the meter or because of the display being possible to damage the meter.

Article 7. The accuracy of the meter shall be subject to the maximum permissible error as specified in this Notification.

The maximum permissible error for granting the initial verification and the subsequent verification shall be subject to the stipulation in Article 18.

The maximum permissible error for the examination of the used meter shall be two times of the maximum permissible error for granting the initial verification.

Article 8. The water meter shall have the indicating device in a satisfactory manner and in a sufficient number for operation.

Article 9. The display of value of the water meter shall have the following characteristics.

- (1) Display of Value in Type of Analog Indication

(a) The scale mark and the indicating device shall be designed appropriately and operate connectively.

(b) The scale mark, numbers, alphabets or other symbols shall be easily read, clearly and indelibly.

(c) If there are many places of the indicating device, every place shall display the consistent value.

(d) If there is the printing device, the value of printing shall be consistent with the value of displaying.

(2) Display of Value in Type of Digital Indication

(a) The display of value, whether using numbers, alphabets or other symbols unitedly or not, shall not cause confusion in reading the value.

(b) If there are many places of the indicating device, every place shall display the same value.

(c) If there are the indicating devices in both digital and analog types, the display of value in the digital type shall be consistent with the display of value in the analog type.

(d) If there is the printing device, the value of printing shall be consistent with the value of displaying.

(3) In the case of displaying the value of the meter which can calculate the price, the sum of money shall be consistent with the volume of the measurement as displayed.

Article 10. The inscriptions of all of the controllers for operation, the indicating device and other equipment, including the switch of the water meter shall be made to be easily read, clearly and indelibly.

Article 11. The water meter shall provide a space for sealing so as to prevent the modification after the examination and verification. The meter shall be modified or repaired after the sealing is destroyed.

Article 12. In the case where there is a software program to be used with the water meter, and the aforesaid program results in the accuracy of the meter,

(1) the program shall neither cause the accuracy of the meter to deviate exceeding the maximum permissible error, nor express, print, calculate or record the value of the measurement result to deviate exceeding the maximum permissible error after the examination and verification, and there shall be protection methods to prevent the modification or the adjustment of the program by means of a mechanical seal or an electronic seal, e.g. an audit trail, or both methods together,

(2) the business operator of the meter or the possessor is required to display a name, a model and a software identification relating to the program on the indicating device or the value recording device every time of closing or opening the meter, or such data can be seen when an operator or a relevant person requires,

(3) the business operator of the meter or the possessor is required to produce a complete guidebook to use the program in accordance with the use of the meter, and the guidebook shall always be presented to a competent official or the Weights and Measures Inspector.

In the case of a software program to be used with the device which is extended further away from the meter, the business operator of the meter or the possessor shall take the following actions :

(1) to inform to a name, a model and a software identification relating to the program together with a product owner including other details to a competent official at the Central Bureau or the Branch Bureau within 15 days as from the date of the completion of installation,

(2) to display a name, a model and a software identification relating to the program and necessary information on the extended device clearly and indelibly.

Chapter 2

Water Meter

Article 13. The water meter shall have the following characteristics.

(1) The water meter shall be designed to comprise a measurement transducer, a calculator and an indicating device by being able to measure continuously the volume of water through the measurement transducer, and to transform the volume of water as measured for calculating, and then displaying the value of the volume of water as measured.

(2) If the water meter is designed to install in a manner which allows the flow of water to reverse passing through the water meter, upon the flow of water reversing passing through the water meter, the measurement transducer and the indicating device shall have reverse movement, and neither cause damage to the water meter nor diminish the accuracy of measurement.

(3) The water meter shall be manufactured from materials of adequate strength and durability for the purpose of operation, neither easily rusting nor reacting or contaminating with water, and being resistant to temperature variations.

(4) The water meter shall be durable throughout the working pressure range by not reducing the efficiency of operation, not causing the outflow of water along the water meter, and not changing the shape of the water meter.

(a) The water meter of diameter less than 50 centimetres shall be durable under the pressure at least 1,000 kPa.

(b) The water meter of diameter starting from 50 centimetres upward shall be durable under the pressure at least 600 kPa.

(5) The pressure loss through the water meter shall not be greater than 63 kPa. upon operation between the minimum flowrate and the permanent flowrate.

(6) Indicating Device

(a) The indicating device shall be sealed tightly for the prevention of condensation forming.

(b) The indicating device which has the display of sub value shall display the value of the volume of water in a manner of easy understanding and no ambiguity.

(c) The display of the value of the volume of water shall be made in either manner as follows:

1) the display of value in the type of analog device by having the scale mark and the scale mark matched with the number and possibly comprising 1 element or several elements within the same dial,

2) the display of value in the type of digital indication,

3) the display of value in both analog and digital types unitedly.

(d) The water meter shall display the value of volume in cubic meter, by

1) the numbers expressing the value of volume in the integer of cubic meter shall have no multiple,

2) the numbers expressing the value of volume in the integer of cubic meter and the fractional component of cubic meter shall be displayed by color or other means in order to provide a clearly different vision.

(e) As for the digital indicating device, the height of the digits shall not be less than 4 millimeters.

(f) As for the analog indicating device,

1) the principal scale mark shall display the value of volume in cubic meter and be of the form 10^k , whereby k is a positive or negative whole number or zero, including displaying the symbol adjacent to the indicating device in order of priority x 1000, x 100, x 10, x 1, x0.1, x 0.01, x 0.001,

2) the rotational movement of the pointers or circular scales shall be clockwise,

3) if it is the numbered roller indicator, its movement shall be upwards.

(g) Verification Scale Mark,

1) the verification scale mark shall display the unit in cubic meter and in the form 1×10^k , 2×10^k or 5×10^k whereby k is a positive or negative whole number or zero,

2) as for the analog and digital indicating device which displays the value of the smallest scale mark continuously, the verification scale mark on the analog indicating device shall have the value equal to the scale interval or equal to the division of the interval between two consecutive scales into 2, 5 or 10 equal parts,

3) as for the digital indicating device which displays the value of the smallest scale mark discontinuously, the verification scale mark shall have the value equal to the difference between consecutive principal scale marks,

4) as for the indicating device which displays the value of the smallest scale mark continuously, the interval between the verification scale marks shall not be less than 1 millimeter and not more than 5 millimeters,

5) the scale marks which are consistent shall have an equal width in a straight line, and the width shall not exceed $\frac{1}{4}$ times of the interval between the scale marks,

6) the width of the pointer shall not exceed $\frac{1}{4}$ times of the interval between the principal scale marks and not be greater than 0.5 millimeters,

7) the verification principal scale marks shall be read to be equal to or more detailed than the values which are calculated by the following equation.

| Accuracy Class | Verification Principal Scale Marks (Cubic Meter (m^3)) | |
|----------------|---|--|
| | Display of Value of Scale Marks Continuously | Display of Value of Scale Marks Discontinuously |
| Class 1 | $\leq Q_1 (m^3/h) \times 1.5 (h) \times 0.0025$ | $\leq Q_1 (m^3/h) \times 1.5 (h) \times 0.00125$ |
| Class 2 | $\leq Q_1 (m^3/h) \times 1.5 (h) \times 0.0050$ | $\leq Q_1 (m^3/h) \times 1.5 (h) \times 0.00250$ |

(h) The indicating device of the water meter shall be able to display the value of volume without passing through zero as follows.

| Permanent Flowrate (Q_3) (m^3/h) | Indicating Range of a Water Meter (minimum values) (m^3) |
|---|--|
| $Q_3 \leq 6.3$ | 9999 |
| $6.3 < Q_3 \leq 63$ | 99999 |
| $63 < Q_3 \leq 630$ | 999999 |
| $630 < Q_3 \leq 6300$ | 9999999 |

(7) The water meter which can adjust the proportion of the indicated volume and the actual volume of the water flow shall provide a place for sealing in order for the protection of adjustment.

(8) The calculation device and the electronic indicating device shall have to provide the method to prevent the revisions of variable value and other constant adversely affecting the accuracy of the water meter, or to record the event of such revisions.

(9) In the case of the ancillary device and the associated device which connect a signal through a signal connection equipment mounted on the outside of the water meter, the ancillary device and the associated device shall not cause the errors of measurement result and data. In addition, such devices shall not be able to transmit an order or data to the water meter to cause the meter to display, to print, to calculate or to record the measurement result of volume to be different from a situation where there is no such equipment connected to the water meter. Besides, the provision for sealing the aforesaid outside signal connection equipment shall be made.

(10) In the case of the water meter which is driven by a magnet, the water meter shall have to provide an equipment to be able to prevent a magnetic field adversely affecting the correctness of the water meter.

Article 14. In a case of the water meter equipped with the zero setting device for the volume indicating device, the transmission stopping mechanism device, the printing device, these devices shall have the following characteristics.

(1) Zero Setting Device for Volume Indicating Device

(a) The volume indicating device may provide the zero setting device which can be adjusted by hand or by an automatic system.

(b) At the beginning of setting zero, the volume indicating device shall not display the result to be different from the previous measurement result, and shall display zero upon the completion of setting zero.

(c) The zero setting device shall not cause any change to the measurement result, except for a change to the display of zero.

(d) At the time of measuring, there shall be no means to be capable of adjusting the volume indicating device to display the value of zero.

(e) In the case of the analog indicating device, the display of volume after the completion of setting zero shall deviate not greater than the half of the minimum specified quantity deviation (E_{\min}).

(f) In the case of the digital indicating device, the display of volume after the completion of setting zero shall not deviate, and shall display the value of zero only.

(2) Transmission Stopping Mechanism Device

(a) The principal scale mark and the measurement unit of the transmission stopping mechanism device shall be the same as the indicating device.

(b) It can stop the transmission accurately. And in the case where the meter has the pre-setting device, the volume or the amount of money which are preset shall display the value prior to the measurement. Upon stopping the transmission, the indicating device shall display the volume of transmission or the total purchase price to be the same as the value as preset.

(c) The stop setting part shall make the stopping mechanism to be capable of adjusting the distance of stop so that the volume of transmission shall be in a specified scope.

(3) As for the printing device, the provisions in Article 13 (6), (a), (b), (c), (d), (e) and (f) shall be applied mutatis mutandis.

Article 15. The water meter shall be clearly and indelibly marked with the following information :

- (1) accuracy class of measurement,
- (2) permanent flowrate,
- (3) minimum flowrate or the ratio between permanent flowrate and minimum flowrate,
- (4) year of manufacture,
- (5) sign of direction of water flow,
- (6) maximum admissible pressure if it exceeds 1,000 kPa.

Article 16. The accuracy of the water measurement system shall be divided into 2 classes as follows:

- (1) the first class, symbol 1 or 1,
- (2) the second class, symbol 2 or 2,

Article 17. The water meter shall be designed and manufactured upon the base between the value of permanent flowrate (Q_3) expressed in m^3/h and the ratio between permanent flowrate (Q_3) and minimum flowrate (Q_1) according to the following characteristics.

(1) The water meter shall be designated by the permanent flowrate expressed in m^3/h to be any value chosen from the list or higher or lower values than serial values as follows:

| | | | | |
|------|------|------|------|------|
| 1 | 1.6 | 2.5 | 4 | 6.3 |
| 10 | 16 | 25 | 40 | 63 |
| 100 | 160 | 250 | 400 | 630 |
| 1000 | 1600 | 2500 | 4000 | 6300 |

(2) The water meter shall be designated by the ratio between permanent flowrate and minimum flowrate to be any value chosen from the list or higher or lower values than serial values as follows:

| | | | | | | | | | |
|-----|------|-----|-----|-----|------|-----|-----|-----|-----|
| 10 | 12.5 | 1.6 | 20 | 25 | 31.5 | 40 | 50 | 63 | 80 |
| 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 |

(3) The water meter shall be designated by the ratio between transitional flowrate (Q_2) and minimum flowrate (Q_1) to be equal to 1.6.

(4) The water meter shall be designated by the ratio between overload flowrate (Q_4) and permanent flowrate (Q_3) to be equal to 1.25.

(5) The accuracy class one is the water meter with permanent flowrate starting from $100 m^3/h$ upward and having the maximum permissible errors as specified in Article 18 of this Notification.

(6) The accuracy class two is the water meter with the maximum permissible error as specified in Article 18 of this Notification.

Article 18. The maximum permissible error for granting the initial verification and the subsequent verification of the water measurement system shall have both positive and negative sides as follows:

| Accuracy Class | Maximum Permissible Error Compared to Volume as Tested (V) | |
|--|---|---------------------|
| | Lower Flowrate Zone | Upper Flowrate Zone |
| Class 1 Entrance Temperatures to Water Meter - from 0.1 to 30 Degree Celsius - more than 30 but not exceeding 50 Degree Celsius | 3 % V 3 % V | 1 % V 2 % V |
| Class 2 Entrance Temperatures to Water Meter - from 0.1 to 30 Degree Celsius - more than 30 but not exceeding 50 Degree Celsius | 5 % V 5 % V | 2 % V 3 % V |

The deviation value of the meter in every flowrate that deviates in the same side shall have at least any one value not exceeding the half of the maximum permissible error.

Given on the 26th Day of September B.E. 2561 (2018)

Sontirat Sontijirawong

Minister of Commerce