

Notification of the Ministry of Commerce

Regarding Prescription of Type and Characteristic of Meter for Gas in Vapor State, Detail of Materials Used for Manufacture, Maximum Permissible Error and Term of Verification

In order to prescribe the type and characteristic of the meter for the gas in a vapor state to be clear and standardized, resulting in fairness to all parties pertinent to the purchase – sale, the Weights and Measures Committee had resolution at the meeting No. 1/2562 on Tuesday, 25 April B.E. 2562 (2019) to prescribe the type and characteristic of the meter for the gas in a vapor state, the detail of materials used for manufacture, the maximum permissible error and the term of verification.

By virtue of Section 5, paragraph two of Section 8, Section 16, Section 26 and Section 33 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, therefore issues 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 :

“Gas in Vapor State” means the gas to be used as fuel or other gas in a state of liquid alone, solid gas and compressed natural gas are not included;

“Rated Operating Conditions” mean the conditions of the use of the meter which still provide correct results within the maximum permissible errors, e.g. the type of the gas in a vapor state, the density of the gas in a vapor state, the viscosity of the gas in a vapor state, the temperature and the pressure of the gas in a vapor state, including other stipulations which affect the operation of the meter;

“Base Conditions” mean the states of the gas in a vapor state which are measured, whereby the measured volume of the gas in a vapor state is converted according to its condition, namely its base temperature and base pressure, by categorizing the base temperature into 0, 15, 20 or 30 degrees Celsius, and the base pressure is 101.325 kilopascal;

¹ Published in the Government Gazette, Volume 136, Special Part 276 d, Page 38, dated 11 November B.E. 2562 (2019).

“Metering Conditions” mean the conditions of the gas in a vapor state which are measured the volume at the time of measurement, namely the temperature and pressure of the gas in a vapor state during that time;

“System of Measuring Volume of Gas in Vapor State” means the system comprising the meter for the volume of the gas in a vapor state, the ancillary device and the associated device;

“Ancillary Device” means the device which is used to specially 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 filter, a pump, a valve, or a pipe;

“Conversion Device” means the device which is used to specially perform a particular function for the following automatic conversions:

(1) converting the value of the volume as measured at the metering conditions to the value of the volume at the base conditions or

(2) converting the value of the volume as measured at the metering conditions to the mass value;

“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;

“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 case of the display of the value for analog indication, or the difference between two consecutive values as displayed, in case of the display of the value for digital indication;

“Flowrate : Q” means the volume of the gas in a vapor state passing through the meter and the time taken for this volume to pass through the meter;

“Maximum Flowrate : Q_{max} ” means the highest flowrate at which the meter can operate without damaging the meter, and the deviation of the measurement of volume of the meter not exceeding the maximum permissible errors as specified;

“Minimum Flowrate : Q_{min} ” means the lowest flowrate at which the meter can operate, by the deviation of the meter not exceeding the maximum permissible errors as specified;

“Transitional Flowrate : Q_t ” 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 errors as specified according to each flowrate zone;

“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 maximum flowrate;

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

“Permissible Shift of Indication” means the difference between the value of volume which is displayed by the indicating device and the value of real volume of gas by displaying the percentage value.

Title 1

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

Article 3. The meter for the gas in a vapor state which has the operation principle of positive displacement, namely the diaphragm gas meter and the rotary gas meter, and the operation principle of inferred displacement, namely the turbine gas meter, shall be the gauge being subject to the Measurement Act, B. E. 2542 (1999) , as amended by the Measurement Act (No. 3), B.E. 2557 (2014).

Title 2

Type of Meter for Gas in Vapor State

Article 4. There are two types of the meter for the gas in a vapor state, namely
(1) the positive displacement gas meter which is divided into 2 types, namely
(a) the diaphragm gas meter that is the meter for measuring the volume of the gas flowing through a measuring unit by the elasticity of the wall of the measuring unit, and

(b) the rotary gas meter that is the meter for measuring the volume of the gas flow by the measuring unit having a certain volume and being made to rotate, whereby the number of the round of the rotation of the measuring unit shall be converted into the volume as measured;

(2) the inferred displacement gas meter, namely the turbine gas meter that is the meter for measuring the volume of gas at the turbine wheel which spins at the time of the gas flowing through, whereby the number of the round of the spin of the turbine wheel shall be converted into the value of the volume of the gas flowing through the meter.

Title 3

Characteristic, Detail of Materials Used for Production, Maximum Permissible Error and Term of Verification

Chapter 1

General Provisions

Article 5. The meter for the gas in a vapor state 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 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 provide verification for the aforesaid meter.

Article 6. The meter for the gas in a vapor state shall be produced permanently. In addition, it shall not be simply used as a tool of fraud.

The meter for the gas in a vapor state 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 case of adjusting the meter, the adjusted meter is required to maintain the condition of accuracy appropriately.

In 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 7. The meter for the gas in a vapor state shall display the following details on the instrument. Such details shall be easy to read, clear and indelible.

- (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 8. The accuracy of the meter for the gas in a vapor state shall be subject to the maximum permissible errors as specified in this Notification.

The maximum permissible errors for providing the initial verification and the subsequent verification shall be subject to the stipulations in Article 16 and Article 18.

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

Article 9. The meter for the gas in a vapor state shall have the indicating device in a satisfactory manner and in a sufficient number for operation.

Article 10. The display of the value of the meter for the gas in a vapor state 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 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 11. The inscriptions of all of the controllers for operation, the indicating device and other equipment, including the switch of the meter for the gas in a vapor state shall be made to be easy to read, clear and indelible.

Article 12. The meter for the gas in a vapor state shall provide a space for a tamper-evident seal so as to prevent unauthorized alterations after the examination and verification. The meter shall be modified or repaired after the seal is destroyed.

Article 13. In the case where there is a software program to be used with the meter for the gas in a vapor state, 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 errors, nor express, print, calculate or record the value of the measurement result to deviate exceeding the maximum permissible errors 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 and/or the value recording device every time of closing or opening the meter, or such data can be seen when an user 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 for inspection.

In 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

Meter for Gas in Vapor State

Article 14. The meter for the gas in a vapor state shall have the following characteristics.

(1) The meter shall be produced from materials being suitable for the gas to be measured. The meter shall also be durable and safe to use in the rated operating conditions.

(2) The system of measuring the volume of the gas in a vapor state shall clearly and indelibly display the following details.

(a) a year of production,

(b) the minimum flowrate and the maximum flowrate,

(c) the maximum pressure at the time of operation,

(d) the range of the metering conditions,

(e) as for the positive displacement gas meter, it is required to display the volume in the number of 1 round of measurement.

(3) Indicating Device

(a) The indicating device shall be able to display the measurement result of gas volume immediately by displaying the unit of measurement and numbers on the indicating device. In case of displaying the value of gas volume at the base conditions, it is required to display the value of the base conditions together with the aforesaid measurement result of gas volume in a clear manner.

(b) The principal scale mark shall have the value not exceeding 1 m^3 or not exceeding the volume flowing through the meter for the gas volume within a period of 1 hour at the minimum flowrate, whichever is higher.

(c) The principal scale mark shall be displayed to be the value 1×10^k or 2×10^k or 5×10^k , by k being a positive or negative whole number or zero.

(d) The indicating device shall be able to display the value of volume when the gas has flowed through the meter for the gas volume at the maximum flowrate for 2,000 hours without returning to display the value at the starting position.

(4) The meter shall prevent the disturbance of the signal of electromagnetic wave and the wave of radio frequency from adversely affecting the accuracy of the system of the meter for the gas volume, the display of the value of measurement result, the printing of the value of measurement result.

(5) If a thermometer, a manometer and a density gauge which cooperate with the meter for the gas volume have any effect on the measurement of the meter for the gas volume, they shall be in accordance with the rules as laid down by the Minister.

(6) In examining and providing the verification of the meter for the gas volume by air, the approximate density of the air shall be about 1.2 kilograms per m^3 .

Article 15. The diaphragm gas meter shall have the following additional characteristics.

(1) The range of the flowrate of the diaphragm gas meter shall be in accordance with particulars in the table as shown below.

| Maximum Flowrate (Q_{max}) (m^3 /hour) | Minimum Flowrate (Q_{min}) not Greater than (m^3 /hour) |
|--|---|
| 1 | 0.016 |
| 1.6 | 0.016 |
| 2.5 | 0.016 |
| 4 | 0.025 |
| 6 | 0.040 |
| 10 | 0.060 |
| 16 | 0.100 |
| 25 | 0.160 |
| 40 | 0.250 |
| 65 | 0.400 |
| 100 | 0.650 |
| 160 | 1.000 |
| 250 | 1.600 |

| Maximum Flowrate (Q_{max}) ($m^3/hour$) | Minimum Flowrate (Q_{min}) not Greater than ($m^3/hour$) |
|--|---|
| 400 | 2.500 |
| 650 | 4.000 |
| 1000 | 6.500 |

(2) If the meter for the gas volume has the conversion device for temperature, there shall be only one indicating device for the value of the volume at the base conditions.

(3) The average pressure loss of the diaphragm gas meter throughout the measurement at the maximum flowrate of the gas as tested by air shall have the values not exceeding those as stipulated in the table as shown below.

| Maximum Flowrate of Gas ($m^3/hour$) | Maximum Pressure Loss | |
|---|---|-----------------------------|
| | For Initial Verification and Subsequent Verification (pascal) | For Examination (pascal) |
| 1 to 10 | 200 | 220 |
| 16 to 65 | 300 | 330 |
| 100 to 1000 | 400 | 440 |

Article 16. The maximum permissible errors for providing the initial verification and the subsequent verification of the diaphragm gas meter shall have both positive and negative sides as follows:

(1) When there is the examination and verification of the meter by air, the maximum permissible errors shall be in accordance with particulars in the table as shown below.

| Flowrate | Maximum Permissible Errors | | |
|-----------------------------------|---|-------------------------------|-------------------------------|
| | For Initial Verification and Subsequent Verification | For Examination | |
| | Positive and Negative Sides (percentage) | Positive Side (percentage) | Negative Side (percentage) |
| $Q_{min} \leq Q < 0.1 Q_{max}$ | 3 | 3 | 6 |
| $0.1 Q_{max} \leq Q \leq Q_{max}$ | 1.5 | 3 | 3 |

(2) As for the examination and initial verification and the examination and subsequent verification, if the result of the examination and verification at various flowrates between $0.1 Q_{max}$ and Q_{max} has been found that there are all the deviations of positive side or all the deviations of negative side, the absolute value of each deviation shall not exceed 1.0% of the volume as tested.

(3) As for the diaphragm gas meter which has the conversion device for temperature, the value of the volume as measured at the metering conditions shall be converted to the value of the volume at the base conditions. And the maximum permissible errors shall be stipulated as follows.

(a) The maximum permissible errors under (1) shall be increased both positive and negative sides by 0.5 percent per the range of a temperature of 10 degrees Celsius which differs from the temperature as specified by a producer.

(b) In the event the temperatures at the metering conditions are in the range from 15 degrees Celsius to 25 degrees Celsius, the maximum permissible errors as stipulated under (1) shall be applied. Conversely, if the temperatures at the metering conditions are not in the aforesaid range, the maximum permissible errors as stipulated under (1) shall be increased both positive and negative sides by 1.0 percent.

Article 17. The rotary gas meter and the turbine gas meter shall have the following additional characteristics.

(1) The ranges of the operation of the rotary gas meter and the turbine gas meter shall be in accordance with particulars as stipulated in the table as shown below.

| Types of Design | Maximum Flowrate (m ³ /hour) | Ranges of Operation | | | |
|-----------------|--|--|------|------|------|
| | | 1:10 | 1:20 | 1:30 | 1:50 |
| | | Minimum Flowrate not Greater than (m ³ /hour) | | | |
| G 16 | 25 | 2.5 | 1.3 | 0.8 | 0.5 |
| G 25 | 40 | 4 | 2 | 1.3 | 0.8 |
| G 40 | 65 | 6 | 3 | 2 | 1.3 |
| G 65 | 100 | 10 | 5 | 3 | 2 |
| G 100 | 160 | 16 | 8 | 5 | 3 |
| G 160 | 250 | 25 | 13 | 8 | 5 |
| G 250 | 400 | 40 | 20 | 13 | 8 |
| G 400 | 650 | 65 | 32 | 20 | 13 |
| G 650 | 1,000 | 100 | 50 | 32 | 20 |
| G 1000 | 1,600 | 160 | 80 | 50 | 32 |

(2) In the case where the meter for the gas volume has the conversion device for temperature which can convert the value of the volume as measured at the metering conditions to the value of the volume at the base conditions, the indicating device which displays the value of the volume at the base conditions shall be able to display the value of volume when the gas has flowed through the meter for the gas volume for 2,000 hours at the maximum flowrate and at the minimum temperature without returning to display the value at the starting position.

Article 18. The maximum permissible errors for providing the initial verification and the subsequent verification of the rotary gas meter and the turbine gas meter shall have both positive and negative sides as follows:

(1) When there is the examination and verification of the meter by air, the maximum permissible errors shall be in accordance with particulars in the table as shown below.

| Flowrate | Maximum Permissible Errors | |
|----------------------------|---|------------------------------|
| | For Initial Verification and Subsequent Verification (percentage) | For Examination (percentage) |
| $Q_{\min} \leq Q < Q_t$ | 2 | 3 |
| $Q_t \leq Q \leq Q_{\max}$ | 1 | 1.5 |

Q_t or the transitional flowrate shall have the following values.

| Ranges of Operation | Transitional Flowrate (Q_t) |
|---------------------|---------------------------------|
| 1:10 | 0.20 Q_{\max} |
| 1:20 | 0.20 Q_{\max} |
| 1:30 | 0.15 Q_{\max} |
| 1:50 | 0.10 Q_{\max} |

(2) In the case where there is a shaft extending from the body of the meter for the gas volume in order to be used to drive the associated device or any additional devices being installed jointly with the meter, the driving force of the aforesaid shaft shall not cause the indicating device to display the wrong value. In this regard, there shall be a comparison of the different values of the display of the values of the meter at the minimum flowrate (Q_{\min}) between the shaft extending from the body of the meter for the gas volume used to drive the associated device or any additional devices and a shaft extending from the body of the meter for the gas volume with free rotation. A test by air is required. The display of the values of the measurement result of volume shall have deviations both positive and negative sides not exceeding than the values as stipulated in the table as shown below.

| Values of Minimum Flowrate Q_{\min} | Values of Deviation of Display of Values of Gas Volume as Measured at Q_{\min} (percentage) |
|--|---|
| 0.02 Q_{\max} | 1 |
| 0.03 Q_{\max} | 1 |
| 0.05 Q_{\max} | 1 |
| 0.10 Q_{\max} | 0.5 |

Article 19. The meter for the gas in a vapor state shall have the term of verification for 2 years as from the date of providing the verification.

The meter for the gas in a vapor state which is verified by a repairer shall have the term of verification for 60 days as from the date of providing the verification.

This shall be enforced henceforth.

Given on the 2nd Day of October B.E. 2562 (2019)

Jurin Laksanawisit

Minister of Commerce