



## उत्पाद मैनुअल

आई एस 14439 (भाग 2): 1998 के अनुसार  
विधि माप विज्ञान - गैस आयतन मापी  
भाग 2- डायाफ्राम गैसमापी के लिए

दस्तावेज संख्या - पी एम/आई एस 14439 (भाग 2)/1/ दिसंबर 2021

भारतीय मानक ब्यूरो की स्कीम-1 (अनुरूपता मूल्यांकन) विनियम, 2018 के तहत यह उत्पाद मैनुअल प्रमाणीकरण के प्रचालन में रीति और पारिशिष्ट की सुसंगतता सुनिश्चित करने के लिए सभी क्षेत्रीय/शाखा कार्यालयों और लाइसेंसी द्वारा संदर्भ सामग्री के रूप में उपयोग किया जाएगा। बीआईएस प्रमाणीकरण लाइसेंस/ प्रमाणपत्र प्राप्त करने के इच्छुक भावी आवेदकों द्वारा भी इस दस्तावेज का उपयोग किया जा सकता है।

## PRODUCT MANUAL FOR LEGAL METROLOGY- GAS VOLUME METERS PART 2- DIAPHRAGM GAS METERS ACCORDING to IS 14439 (Part 2): 1998

Document No.- PM/IS 14439 (Part 2)/1/ December 2021

*This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.*

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**PRODUCT MANUAL FOR  
LEGAL METROLOGY- GAS VOLUME METERS  
PART 2- DIAPHRAGM GAS METERS  
ACCORDING to IS 14439 (Part 2): 1998**

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|    |                                             |   |                                                                                                                                                                                                                                                                          |
|----|---------------------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | <b>Product</b>                              | : | IS 14439 (Part 2): 1998                                                                                                                                                                                                                                                  |
|    | <b>Title</b>                                | : | Legal Metrology- Gas Volume Meters - Part 2- Diaphragm Gas Meters                                                                                                                                                                                                        |
|    | <b>No. of Amendments</b>                    | : | Three                                                                                                                                                                                                                                                                    |
| 2. | <b>Sampling Guidelines:</b>                 |   |                                                                                                                                                                                                                                                                          |
| a) | <b>Raw material</b>                         | : | Declaration regarding source/supplier of Indicating device, Test element and Electronic device to be obtained from manufacturer.                                                                                                                                         |
| b) | <b>Grouping guidelines</b>                  | : | Pattern approval from statutory authority under Legal Metrology Act shall be obtained and submitted for each variety of Diaphragm Gas meter, for BIS Certification. Each variety of Diaphragm Gas meter shall be tested for grant of licence/change in scope of licence. |
| c) | <b>Sample Size</b>                          | : | Six nos.                                                                                                                                                                                                                                                                 |
| d) | <b>Sampling during operation of licence</b> | : | Licence is granted and operated on factory testing basis, 2 man-days are required for complete testing. Durability test shall be done once in 2 years.                                                                                                                   |
| 3. | <b>List of Test Equipment</b>               | : | Please refer ANNEX – A                                                                                                                                                                                                                                                   |
| 4. | <b>Scheme of Inspection and Testing</b>     | : | Please refer ANNEX – B                                                                                                                                                                                                                                                   |
| 5. | <b>Possible tests in a day</b>              | : | All tests except Durability test as per Cl. 8.2                                                                                                                                                                                                                          |
| 6. | <b>Scope of the Licence</b>                 | : | Please refer ANNEX – C                                                                                                                                                                                                                                                   |

**ANNEX A****List of Test Equipment*****Major test equipment required to test as per the Indian Standard***

| S. No.                                                        | Test Equipment                                                                                                                                | Tests used in with Clause Reference                                                                                      |
|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| 1                                                             | Test Bench for Gas Meter with Calibrated Ref. Flow, Inbuilt Temp., Humidity & Pressure Sensor and with Indicating device error reading setup. | Test element, Cl. 5                                                                                                      |
|                                                               |                                                                                                                                               | Maximum Permissible Errors, Cl. 6                                                                                        |
|                                                               |                                                                                                                                               | Pressure Absorption, Cl. 7                                                                                               |
|                                                               |                                                                                                                                               | Pattern Approval, Cl. 8                                                                                                  |
| 2                                                             | Test setup for Gas Meter Case Leakage                                                                                                         | Soundness of Cases, Cl. 4.2.3 IS 14439 (Part-1)                                                                          |
| 3                                                             | Temperature & Humidity Data logger                                                                                                            | Monitoring Ambient Test Conditions Cl A-1, Annexure-A IS 14439 (Part-2)                                                  |
| 4                                                             | Conditioning Test Apparatus for Durability test                                                                                               | Durability Test Cl 8.2.3 of IS 14430 (Part-2)                                                                            |
| 5                                                             | Dry type Air Compressor                                                                                                                       | Common equipment providing Dry air supply for all flow tests                                                             |
| <b>Additional Testing equipment for Electronic Gas Meters</b> |                                                                                                                                               |                                                                                                                          |
| 6                                                             | Test apparatus (Oven, Freezer, Humidity chamber ) as per Annexure-B of IS 14439 (Part-1)                                                      | Dry Heat Test B-1, Cl 10.2, 10.3, 12.1.5.3, 12.1.5.4 of IS 14439 (Part-1)                                                |
|                                                               |                                                                                                                                               | Cold Test, B-2, Cl 10.2, 10.3, 12.1.5.3, 12.1.5.4 of IS 14439 (Part-1)                                                   |
|                                                               |                                                                                                                                               | Damp Heat Cyclic , B-3, Cl 10.2, 10.3, 12.1.5.3, 12.1.5.4 of IS 14439 (Part-1)                                           |
| 7                                                             | Power supply source at specified voltage, frequency                                                                                           | Variations in Mains Power supply, Cl. B-4                                                                                |
|                                                               |                                                                                                                                               | Short-Time Power Reduction, B-7                                                                                          |
|                                                               |                                                                                                                                               | Electrical Bursts, B-8                                                                                                   |
|                                                               |                                                                                                                                               | Electrostatic Discharge, B-9                                                                                             |
| 8                                                             | Vibration Testing Bench                                                                                                                       | Cl 12.1.5.3<br>Vibration (Random) B-5(a), Vibration (Sinusoidal) B-5(b), Mechanical Shock B-6, Annex B IS 14439 (Part-1) |
| 9                                                             | Electromagnetic Susceptibility Test Apparatus                                                                                                 | Susceptibility B-10 Annexure-B of IS 14439 (Part-1)                                                                      |

***The above list is indicative only and may not be treated as exhaustive.***

**ANNEX B**

**Scheme of Inspection and Testing**

**1. LABORATORY** - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

**1.1** The manufacturer shall prepare a calibration plan for the test equipments.

**2. TEST RECORDS** – The manufacturer shall maintain test records for the tests carried out to establish conformity.

**3. LABELLING AND MARKING** – As per the requirement of IS 14439 (Part 1) and IS 14439 (Part 2). The pattern approval mark assigned by Statutory authority shall be marked on each meter as per Cl. 5.1 (a) of IS 14439 (Part 1).

**4. CONTROL UNIT** – Gas Volume Meters of same variety produced on same production line in a day from the same consignment of raw material shall be considered as one control unit.

**5. LEVELS OF CONTROL** - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

**5.1** All the production which conforms to the Indian Standards and covered by the licence should be marked with Standard Mark.

**6. REJECTIONS** – Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016.

**TABLE 1**

| (1)          |                                        |                |                                        | (2)                                                                                         | (3)               |                                                                                                                                                            |         |
|--------------|----------------------------------------|----------------|----------------------------------------|---------------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Test Details |                                        |                |                                        | Test equipment<br>requirement<br>R: required<br>(or)<br>S: Sub-<br>contracting<br>permitted | Levels of Control |                                                                                                                                                            |         |
| Cl.          | Requirement                            | Test Method    |                                        |                                                                                             | No. of Sample     | Frequency                                                                                                                                                  | Remarks |
|              |                                        | Clause         | Reference                              |                                                                                             |                   |                                                                                                                                                            |         |
| 4            | General requirements                   | 4              | IS 14439 (Part 1)                      | R                                                                                           | Each gas meter    |                                                                                                                                                            |         |
| 6.1          | Indicative device                      | 6.1            | IS 14439 (Part 1)                      | R                                                                                           | 3                 | Every time source/supplier of Indicating Device/ Test element is changed for the approved variety. Every change of source/ supplier to be informed to BIS. |         |
| 6.2          | Test element                           | 6.2            | IS 14439 (Part 1)                      | R                                                                                           | 3                 |                                                                                                                                                            |         |
| 5.1          |                                        | 5.1            | IS 14439 (Part 2)                      |                                                                                             |                   |                                                                                                                                                            |         |
| 11           | Requirements for Electronic Gas Meters | 11.1, 11.2     | IS 14439 (Part 1)                      | R                                                                                           | Each gas meter    |                                                                                                                                                            |         |
| 12.1.5       | Tests for electronic gas meters        | 12.1.5 Annex B | IS 14439 (Part 1)                      | R                                                                                           | 3                 | Every time source/supplier of Electronic module is changed for the approved variety. Every change of source/ supplier to be informed to BIS.               |         |
| 3            | Working range                          | 3.1            | IS 14439 (Part 2)                      | R                                                                                           | 3                 | Each Control Unit                                                                                                                                          |         |
| 4            | Details of construction                | 4.1            | IS 14439 (Part 2)                      | R                                                                                           | Each gas meter    |                                                                                                                                                            |         |
| 6            | Maximum permissible errors             | 6<br>7         | IS 14439 (Part 2)<br>IS 14439 (Part 1) | R                                                                                           | Each gas meter    |                                                                                                                                                            |         |
| 7            | Pressure absorption                    | 7              | IS 14439 (Part 2)                      | R                                                                                           | Each gas meter    |                                                                                                                                                            |         |
| 8            | Examination                            | 8.2.1 to 8.2.2 | IS 14439 (Part 2)                      | R                                                                                           | 3                 | Once in two years for each variety                                                                                                                         |         |
|              | Durability test                        | 8.2.3          | IS 14439 (Part 2)                      | R                                                                                           | 3                 |                                                                                                                                                            |         |
| 9            | Initial verification (Examination)     | 9.1            | IS 14439 (Part 2)                      | R                                                                                           | Each gas meter    |                                                                                                                                                            |         |

|   |               |     |                   |   |                |  |
|---|---------------|-----|-------------------|---|----------------|--|
| 9 | Accuracy test | 9.2 | IS 14439 (Part 2) | R | Each gas meter |  |
|---|---------------|-----|-------------------|---|----------------|--|

Note-1: Levels of control given in column 3 are only recommendatory in nature. The manufacturer may define the control unit/batch/lot and submit his own levels of control in column 3 with proper justification for approval by BO Head.

**ANNEX C****Scope of Licence**

|                                                                                                  |                                                                   |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| “Licence is granted to use Standard Mark as per IS 14439 (Part 2):1998 with the following scope: |                                                                   |
| Name of the product                                                                              | Legal Metrology- Gas Volume Meters - Part 2- Diaphragm Gas Meters |
| Gas meter designation (G)                                                                        |                                                                   |
| Maximum working pressure, $P_{max}$                                                              |                                                                   |
| Nominal value of cyclic volume, V                                                                |                                                                   |
| Type of indicating device                                                                        | Mechanical/ Electronic/ Combination of Mechanical and Electronic  |
| No. of drums/figures                                                                             |                                                                   |
| Additional devices, if provided                                                                  | Prepayment device, Pulse generator, Number of output drive shafts |