

TERMS OF REFERENCE FOR THE R&D PROJECTS

1. Title of the Project: Study of effects of gas flow oscillations on the performance of domestic gas meters.

2. Background:

2.1 Weights and Measures Sectional Committee, PGD 26 under the Production and General Engineering Division Council is working on development of a new Indian Standard for Thermal Mass Flow Gas Meters. The Preliminary draft standard has been circulated for comments. For incorporation of the test for effect of flow disturbances, the outcome of this study will be important.

2.2 The EN 17526 is a European standard on thermal mass flow meters which has a test for accessing the effect of flow disturbances on the metrological performance of a thermal mass flow gas meters (see clause 5.8 of EN 17526 : 2021).

Flow disturbances and oscillations in the gas pipeline are mostly generated by installation conditions, e.g. pipe connections, elbows, valves etc. in front of the meter. These flow disturbances introduce errors in the flowmeter reading often called 'installation effects'.

As part of standard installation practise, in some of the European countries, instead of individual gas regulator for each consumer, a common regulator is used for a group of consumers. Such a condition has the potential to create flow oscillations on real time basis depending on how many consumers connected to a single regulator are using gas at any point of time. This in turn can potentially have an impact on measurement and metering performance.

In India, it is assumed that the standard practise is to use individual regulator for each consumer before gas meter. Due to this practice, flow disturbance and oscillatory phenomenon may not be present before the meter in Indian conditions.

3. Objective:

3.1 To study the effect of gas flow oscillations in the gas supply network on the metrological performance of the Thermal Mass Flow Gas Meters, Ultrasonic Meters and Diaphragm Gas Meters all in G 1.6 capacity or the lowest available capacity in the Indian Market for Domestic Purpose as per test methods identified for e.g. EN 17526: 2021.

3.2 To collect data on the number of households in which the regulators are installed before the Gas meters. To collect data on number of societies where a common regulator is being used for a group of consumers.

3.3 To study the effectiveness of regulators installed at consumer's supply side in India against the flow disturbances.

4. Scope:

4.1 Extensive literature review for method of tests of effects of gas flow oscillations on different types of Gas meters which may include international standards such as ASTM, JIS, EN, ISO etc available on the subject, research papers, any study conducted by other organisations, companies' brochure etc.

4.2 Identifying the manufacturing base and the testing facility for the regulators and the flow meters in India.

4.3 Identify the organized buyers/ users of the gas regulators and take data of the quantity being used by them. Also understand from the users the properties that may be required in the product. Get the records of past installations.

4.4 Check the quantity of the products (both gas meters and regulators) imported and exported and countries with which the trade for this product is occurring. Also check if any technical regulations exist for this product in these countries. Take data of the foreign specification as per which the product is being imported or exported.

4.5 Based on the information collected on the manufacturing base, suggest a sampling plan for collection of samples for testing of gas meters and regulators for approval from BIS.

4.6 Testing of products as per identified test methods. Comparison of performance of different types of gas meters.

4.7 Prepare a comprehensive project report incorporating the points mentioned above.

5. Research Methodology:

5.1 Study the literature and analyse the findings.

5.2 With the help of a structured questionnaire, collection of feedback. Interview with the major exporters, importers, users and labs.

5.3 Preparation of sampling plan, collection of meters and regulators available in Indian market as per the approved sampling plan, testing of the products as per identified test methods.

5.4. On-site visits to gas meter manufacturing units, laboratories and city gas distributors/ installation sites.

a) Two manufacturers of gas meters preferably one large and one msme should be visited.

b) Two laboratories, preferably one in government sector and one in private sector should be visited.

c) Two city gas distributors along with installation sites should be visited.

5.5 Focus group discussions with industry experts and stakeholders to gather valuable insights and feedback.

6. Requirement for the CVs:

The project will engage experts with qualifications and experience in Mechanical engineering, Industrial Metrology, Standardization or any other relevant field. CVs of the personnel involved in the project will be required to assess their expertise.

7. Expected Deliverables:

7.1 Analytical report on the effects of flow disturbances on the metrological performance of a thermal Mass Flow Meters for domestic use in India and Comparison of metrological performance of Ultrasonic gas meters and Diaphragm gas meters with Thermal mass flow meters against flow disturbances as per tests identified. (for example, clause 5.8 of EN 17526 : 2021).

7.2 Report on effectiveness of gas regulators provided by CGDs against various supply flow disturbances.

7.3 Report on percentage of domestic gas meter connections having individual flow regulators at the point of installation of gas meter. Report on number of societies where a common regulator is being used for a group of consumers.

7.4 Along with the report the following has to be appended to the report:

- i. Summary of literature review
- ii. Summary of the interview
- iii. Outcome of the market survey
- iv. Comparison matrix of the various tests.

8. Timeline and Method of Progress Review:

The duration of the project is 6 months from the date of award of the project. The proposed indicative timeline stage-wise is given below:

Sr No	Stage	Time from date of award of project (cumulative)
1	Literature review and identification of manufacturing base, testing laboratories, user/user industry, and discussion with BIS for the finalization of sampling plan	2 months
2	Visit to manufacturers, testing laboratories, users and importers and exporters and data collection	4 months
3	Preparation and submission of first draft report to BIS	4.5 months

4	Submission of final project report	6 months
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Note : The proposer may submit the draft report to BIS without waiting for test report from independent laboratories if the test is of long duration.

9. Support BIS will Provide:

National /International standards relevant to the project.

10. Nodal Person

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