TERMS OF REFERENCE FOR THE R&D PROJECTS

1. **Title of the Project**: Calibration of vertical oil storage tanks in India.

2. **Background:**

2.1 The Weights and Measures Sectional Committee, PGD 26 under the Production and General Engineering Division Council has published IS 2007 : 1974 Method for calibration of vertical oil storage tanks and IS 2008 : 1961 Method for Computation of Capacity Tables for Vertical Oil Storage Tanks.

2.2 The Indian Standards are presently undergoing a comprehensive review. IS 2007 delineates the conditions, frequency, and required accuracy levels for calibration and recalibration. Additionally, it addresses the impact of liquid head and temperature on the expansion and contraction of steel tanks. The primary objective of this standard is to ensure a consistent and uniform application of the specified methods nationwide. Meanwhile, IS 2008 provides a systematic approach for computing capacity tables essential in the calibration process. This includes guidance on constructing tank tables, making corrections to measure circumference and diameter, and performing necessary calculations.

2.3 The current standards primarily emphasize strapping and internal measurement methods to ensure nationwide uniformity in practice. However, to enhance calibration practices, it is essential to identify diverse tank users and conduct a comprehensive survey on their calibration methods. Advances in equipment and evolving practices have contributed to improved accuracy in calibration using strapping and internal measurement methods.

2.4 The existing standard acknowledges that precise calibration is influenced by the expertise of the oil gauger and adherence to sound engineering principles, aspects not explicitly quantified in the standard. It is imperative to investigate how calibration practices have evolved to mitigate non-systematic errors.

2.5 Furthermore, the current standard overlooks emerging calibration methods such as Optical or Laser Scanning, Ultrasonic Measurement, Radar Level Gauges, Hydrostatic Tank Gauging, Float and Tape Measurement, and Guided Wave Radar. A thorough exploration and comparison of these methods with the established practices are essential. Given that these measuring instruments play a role in international trade, studying and comparing conventions in other nations becomes crucial for a comprehensive understanding and potential adoption of best practices.

3. **Objective**:

3.1 To study the various use cases of vertical storage tanks in India.

3.2 To study the various method for calibration of vertical storage tanks and their comparison.

3.3 To Study the Methods for Computation of Capacity Tables for Vertical Oil Storage Tanks in case of strapping and internal measurement method.

4. Scope:

4.1 Extensive literature review on the calibration methods and equipment as mentioned in the background and the objective. The literature review may include International Standards such as ASTM, JIS, EN, ISO, OIML etc available on the subject, research papers, any study conducted by other organisations, study of national and international best practices etc.

4.2 Identification of key users, suppliers, manufacturing bases specializing in various types of measurement and storage tanks, and pinpointing testing facilities/ calibration bodies dedicated to testing and calibration of these equipment within India. Study of their historical data for variation in accuracies and related issues.

4.3 Checking the quantity of the tanks imported and exported. The list of countries with which the trade for this product is occurring. Checking if any technical regulations exist for this product in these countries. Collection of any foreign specifications as per which the product is being imported or exported.

4.4 Visit to Indian manufacturing units and user installation sites and calibration agencies for onsite verification of data collected.

4.5 Preparation of 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 users, suppliers, manufacturing organizations specializing in various types of measurement and storage tanks as applicable.

5.3 Carry out Market Analysis which may include:

a. Identification of Indian stakeholders (manufacturing, testing, user base, regulators and academicians etc)
b. Conduct surveys and interviews with industry experts, manufacturers, and consumers.
c. Analyse EXIM data, sales data, market reports, calibration records and industry publications.
d. Study of National and International regulations on the product.

5.4 Following the data acquisition on suppliers, manufacturing and calibration bodies, present a proposed Visit Plan (VP) for approval from the Bureau of Indian Standards (BIS).

5.5 On-site visits to Manufacturing/Installed units and laboratories/calibration bodies as per the approved visit plan or as given below:

a) Two manufacturers of Storage tanks, one large and one MSME should be visited.

b) Two laboratories/calibration bodies, one in government sector and one in private sector should be visited.

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.

7. Expected Deliverables:

7.1 Analytical report covering all the aspects mentioned in the scope.

7.2 The following has to be appended to the report:

i. Summary of literature review;

ii. Market Analysis Report: Summary of the interview; list of identified stakeholders (Manufacturing, testing, user base, regulators, academicians etc); import export data; existing regulations in India and in countries where the product is imported or exported;

iii. Outcome of the industry visits; and

iv. Comparison matrix of the various test methods.

8. Timeline and Method of Progress Review:

The duration of the project is 3 months from the date of award of the project. The proposed indicative timeline stage-wise is given below:

Timeline	Stages
Week 01	1) Preparation of comprehensive plan identifying the following: a) Details of literature review and summarized reports; b) Identified manufacturers, exporters, importers, laboratories, and users; c) Information gathered from contacting the above stakeholders and visits to be carried out; and 2) Evaluation of the plan by Member Secretary, and provide feedback, if any.
Week 6	1) Submission of progress report along with the report on utilization of the 75 percent of the fund received after project approval. 2) Evaluation and acceptance of the reports by the Sectional Committee.
Week 10	Submission of final report with information as mentioned in the project deliverables.

Timeline	Stages
Week 11	Evaluation of the final report by Sectional Committee, and provide feedback/recommend changes, if any.
Week 12 – Week 13	Submission of final report incorporating recommendations/feedback of the Committee.

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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