

## **TERMS OF REFERENCE FOR R&D PROJECT**

1. **Title of the project:** Comprehensive report on efficiency and performance data for motors for submersible pump sets

2. **Background:**

- BIS has published IS 9283 which specifies the performance characteristics such as rated output, minimum full load speed, minimum starting torque, nominal efficiency etc. for single phase and three phase 2 pole motors of different bore Sizes and maximum Outside diameter.
- The standard has been taken up for revision to include efficiency levels EL 1, EL 2, EL 3 & EL 4 for submersible motors to improve overall efficiency of the system (motor & pump).
- This research aims to collect efficiency and performance data from different manufacturers in India and to verify the values included into the revised draft.

3. **Scope for R&D:**

The scope of the R&D project encompasses the following:

- Literature review- Conduct a comprehensive review of existing literature which will include international standards, if any, research papers, and technical specifications for motors for submersible pump sets.
- Collecting the data related to manufacturing base, testing facility and import/ export of the product and technical regulations/standards followed for export.
- Undertake visits to manufacturing facility (2 each for micro, small, medium and large whichever is available in the country), focused discussion with quality team of manufacturer and carry out in-house testing.
- Undertake visit to one user and one testing lab to gather information through questionnaire regarding the standards regulation, testing methods, performance characteristics such as rated output, minimum full load speed, minimum full load current, minimum starting torque, efficiency values (for EL1 to EL5) etc. for single phase and three phase 2 pole motors of different bore Sizes and maximum Outside diameter.
- Comprehensive report mentioning efficiency and performance data from different manufacturers in India for single phase and three phase 2 pole motors of different bore Sizes and maximum Outside diameter.

4. **Research Methodology:**

The project will involve the following research methodologies:

- a. Undertake literature review in respect of performance/ safety parameters, test methods and other requirements through desktop study, books, magazines, national and international standards/regulation, technical information available with manufactures (small, medium and large scale), laboratories, or any other source.

- b. Identifying the stakeholders, including manufacturer, laboratories, etc. for motors for submersible pump-sets and the following activities shall be carried out:
  - Different variety and raw material
  - Testing methods used
  - Standards being followed
  - Marking and labelling
  - Performance characteristics
  - Efficiency values for different levels
  - Any other relevant information
- c. Collecting the already available efficiency and performance data from concerned stakeholders and comparative analysis with the values mentioned into the revised draft for IS 9283.
- d. Detailed report encompassing test methods for confirming compliance with safety, performance, and energy efficiency requirements for motors for submersible pump-sets.
- e. Submission of the reports summarizing the methodology, results, conclusions, and recommendations for verification of efficiency levels and other performance parameters

**5. Expected Deliverables:**

- a. Analytical report on efficiency levels and performance characteristics for motors for submersible pump-sets and comparative analysis with values mentioned into the revised draft for IS 9283.
- b. A report on export and import data, number of manufacturers, user and laboratories, challenges faced by them, questionnaire feedbacks on the subject matter.

**6. Criteria for Identification of Proposer to conduct Research work:**

- Proposer shall be a technologist with experience in Design, Installation and Maintenance of submersible pump-sets.

**7. Timeline and Method of Progress Review:3 months**

<b>Time line</b>	<b>Method of progress</b>
0 to 15 days	Literature review, Desktop Study
16 to 60 days	Industry Visit and collection of data
60 to 75 days	First Draft Report

76 to 90 days	Consolidation of data, Submission of final report of the project.

**8. Support BIS will Provide:**

- BIS will provide access to latest editions of standards, required for the projects.