

TERMS OF REFERENCE FOR R&D PROJECT

1. **Title of the project:** Study of advanced testing methods and procedures for three - Phase squirrel cage induction motors for centrifugal pumps for agricultural application.

2. **Background:**

- BIS has published IS 7538 which covers three phase squirrel cage induction motors for centrifugal pumps for agricultural applications and where the power supply variation is between +6 and -15 percent of the rated voltage.
- This project is aimed at upgrading this specification by inclusion of new performance parameters and advance testing methods for three - Phase squirrel cage induction motors for centrifugal pumps for agricultural application which are currently being used in the electrical industry. This standard can be accessed from <https://standardsbis.bsbedge.com/>.

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

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

- **Literature Survey** - Conduct an extensive study and comparative analysis of existing literature, research papers, international standards, and any other published information related to three - Phase squirrel cage induction motors for centrifugal pumps for agricultural application.
- **Manufacturing Facility** - Evaluate the level of manufacturing bases in the country to understand the capabilities and quality of production facilities.
- **Study of Import – Export data**- Analyse import and export data of the product in India to gather insights into market trends, demand, and potential for growth.
- **Testing Infrastructure** - Assess the testing infrastructure in the country to determine the availability and adequacy of facilities for conducting product testing and quality assurance.
- **Visits to Manufacturing facilities:** Visit at least two manufacturing facilities for each category (small, medium, and large) of three - Phase squirrel cage induction motors for centrifugal pumps for agricultural application available in the country to observe the production processes, technology used, and overall manufacturing capabilities.

The study will focus on understanding important parameters:

- i. Types of Raw materials/components used.
- ii. Varieties manufactured
- iii. Quality parameters (Performance requirements)
- iv. Manufacturing process,
- v. Safety requirements
- vi. In process quality checks
- vii. Test facilities and test methods used
- viii. Marking and labelling being done
- ix. Packaging requirement
- x. Tests being undertaken
- xi. Testing facilities in the plant

- **Visits to Laboratory facilities:** Visit two laboratory facilities available in the country to examine their modern testing techniques and equipment in line with technological advancements and international best practices, capabilities, and expertise in relation to the product. (Preference shall be given to BIS labs wherever applicable)
- **Collection of Samples and Independent testing:** Collections of 3 random samples from different manufacturers from the market and its testing for generation of test data for important safety and performance requirements.
- **Collection of User feedback-** Visit the users of the product and collect data as mentioned in the scope through a questionnaire.
- **Study of Sustainability Aspects:** The focus of this study is to collect feedback regarding energy efficiency aspects, use of renewable energy sources, recycling of materials, waste disposal process, and management.
- Prepare a comprehensive project report incorporating the points mentioned above.

4. Research Methodology:

The project will involve the following research methodologies:

- Study the literature and analyse the findings.
- Visit the manufacturing unit and
 - a. Observe the manufacturing process,
 - b. Examine in-process control measures,
 - c. Conduct focussed group discussion with quality personnel
 - d. Collect the data as mentioned in the scope through a questionnaire.
 - e. Draw samples and get it tested in BIS approved laboratories
- Visit laboratories and make report on
 - a. Modern testing equipment
 - b. Modern testing method being used
 - c. Testing charges
 - d. Testing time required.
- Visit the identified importers and exporters and collect data as mentioned in the scope through a questionnaire
- Visit the users of the product and collect data as mentioned in the scope through a questionnaire
- Analyse the data and test reports from diverse sources and include the same in the project report.

5. Expected Deliverables:

- a. Comprehensive report mentioning relevant updates and advancements inline with current specifications for three-phase squirrel cage induction motors for agricultural centrifugal pumps
- b. Documentation of the research findings, including an analysis of literature surveys, manufacturing facilities (MSMEs, start-ups, etc.), and testing facilities.

- c. Reports from accredited testing laboratories to validate the accuracy and reliability of the revised testing methods.
- d. Questionnaire, discussion, visit reports, test reports to be appended with the final project report

6. Requirement for the CVs:

Proposer shall be a technologist with experience in Design, Installation and Maintenance of induction motors.

7. Timeline and Method of Progress Review:

The duration of the project is 5 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	1 month
2	Visit to manufacturers, testing laboratories, users and importers and exporters and data collection	3 months
3	Preparation and submission of first draft report to BIS	4 months
4	Submission of final project report	5 months

8. Support BIS will Provide:

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

9. Nodal Person:

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