

## TERMS OF REFERENCE FOR R&D PROJECT

**1. Title of the project:** Study of the technological advancement in the thermocouple pyrometers and different types of pyrometers used in the industry

### **2. Background:**

**2.1** Pyrometer is an instrument for measuring temperature usually by electrical means used especially in furnaces.

**2.2** Indian Standard, IS 2053: 1974 covers thermocouple pyrometers.

**2.3** The research and development project focus on the study of different types of pyrometers used in the industry including optical pyrometers and Infrared/radiation pyrometers and the ways and means to achieve improved accuracy to ensure that the standard is in line with the current technological advancements and industry requirements.

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

- a) Extensive and thorough examination of the available literature on various types of pyrometers including but not restricted to the following and provide comparative analysis:
  - International standards;
  - Research papers;
  - Guidelines by ministry/regulatory bodies;
  - Any studies being conducted by any organization; and
  - Any other sources.
- b) Identification of manufacturing base of pyrometers in India. Collection of information on manufacturing process, and product quality and analysis.
- c) Identification of exporters and importers of pyrometers in India. Collection of information on product quality and technical regulations/standards followed for export.
- d) Identification of testing infrastructure in India for pyrometers for determination of test methods being followed.
- e) Visit to two manufacturing units of different sectors (Large, MSME etc.) to observe the production processes, technology used and overall manufacturing capabilities.
- f) Identification of user base of pyrometers. Collection of information and analysis.

### **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 literature review, study of 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 pyrometers and the following activities shall be carried out and collect the information on the following data to prepare a detailed report:
  - Different variety and raw material
  - Constructional requirements
  - Testing methods used
  - Standards being followed
  - Marking and labelling
- c. Detailed documentation encompassing reports, technical specifications, and guidelines related to pyrometers.
- d. A comprehensive report documenting the research methodology, findings and recommendations.

**5. Expected Deliverables:**

- a. Analytical report on performance and specifications of various types of pyrometers used in the Industry.
- b. A report on export and import data, number of manufacturers, user and laboratories, challenges faced by them, questionnaire feedbacks, focused group discussion and the national and international regulations on pyrometers.

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

- Proposer shall be a technologist with experience in pyrometers.

**7. Timeline and Method of Progress Review: 5 months**

| <b>Time line</b> | <b>Method of progress</b>   |
|------------------|---|
| 0 to 30 days     | Literature review, Desktop Study, Collection of Data              |
| 30 to 105 days   | Industry Visit and in house testing of samples                    |
| 105 to 120 days  | First Draft Report  |
| 120 to 150 days  | Consolidation of data, Submission of final report of the project. |

The review will be carried out in each month along with consultation of other experts if required.

**8. Support BIS will provide:**

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

Shri Ashok Kumar, Scientist –B and Member Secretary of ETD18, [eetd@bis.gov.in](mailto:eetd@bis.gov.in)