

TERMS OF REFERENCE FOR R&D PROJECT

1. **Title of the project:** Comprehensive Study of advanced road traffic signal systems in India

2. **Background:**

- a) BIS has published IS 7537 which specifies the requirements for electric light signal installations with traditional light source operated from mains, generator or battery supply for controlling road traffic. It also includes reference to operational requirements for the signals and their controller.
- b) The introduction of LED, acknowledged as the most efficient light source, prompted the revision and updating of existing standard to specifically outline the criteria for traffic signals incorporating LED lamps.
- c) Further, solar powered traffic light systems are being used extensively in areas where there is no electricity or power cuts are frequent.
- d) In this connection, this research project aims to collect safety and performance parameters essential for advanced road traffic signals system in India incorporating LED light source powered by conventional (for e.g. mains, generator or battery) or non-conventional energy sources (for e.g. solar).

3. **Objective:** To study advanced road traffic signal systems in India with LED lights operated from conventional and non-conventional energy sources.

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

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

- a. Literature review- Conduct a comprehensive review of existing literature which will include international standards, if any, research papers, and technical specifications published by any lighting industry on advanced road traffic signal systems.
- b. Collecting the data related to manufacturing base, testing facility and import/export of the product and technical regulations/standards followed for export.
- c. 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 inhouse testing.
- d. Undertake visit to one user and one testing lab to gather information through questionnaire regarding the standards regulation, testing methods, quality and challenges faced by them.
- e. Comprehensive report mentioning performance requirements specifically tailored to the requirements of traffic signals incorporating LED lamps and light source powered by conventional (for e.g. mains, generator or battery) or non-conventional energy sources (for e.g. solar).
- f. Integration of LED technology specifications in the report, covering aspects such as light output, color temperature, and power efficiency.

- g. Comprehensive guidelines for installation, testing, and maintenance of traffic light signals

5. 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 advanced road traffic signals and the following activities shall be carried out and report prepared and collect the information on the following data:
 - Different variety and raw material
 - Constructional requirements
 - Optical requirements
 - Operational requirements for controllers
 - Testing methods used
 - Standards being followed
 - Marking and labelling
- c. Detailed documentation encompassing reports, technical specifications, and guidelines related to LED-based lighting.
- d. Detailed test methods for confirming compliance with safety, performance, and energy efficiency requirements for traffic signals incorporating LED lamps and light source
- e. A comprehensive report documenting the research methodology, findings and recommendations.

6 Expected Deliverables:

- a. Analytical report on performance requirements of traffic signals incorporating LED light sources powered by conventional /non-conventional energy sources.
- 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 advance traffic signals systems.

7. Criteria for Identification of Proposer to conduct Research work:

- Proposer shall be a technologist with experience in LED lighting.

8. Timeline and Method of Progress Review: 3 months

Time line	Method of progress
0 to 15 days	Literature review, Desktop Study, Collection of Data
16 to 60 days	Industry Visit and testing of samples (except long duration tests)
60 to 75 days	First Draft Report
76 to 90 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.

9. Support BIS will Provide:

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