TERMS OF REFERENCE FOR R&D PROJECT

1. **Title of the Project**: "Study of Chemical/ Maintenance Free Earthing System used in India".

2. **Background:**

   Indian Standard, IS 3043 covers the requirements pertaining to Earthing and Bonding in Electrical systems. Presently, several manufacturers are asserting the development of systems such as maintenance-free earthing and chemical earthing. However, there are no existing standards nor any research carried out concerning maintenance-free earthing to substantiate these claims.

   The objective of this project is to conduct an extensive study on the utilization of chemical and maintenance-free earthing systems in India and to make prototype installations to conduct simulations and measurements to conclude the claims. This research project aims to fulfil this requirement by analyzing the efficiency, viability, and advantages of chemical and maintenance-free earthing systems in the Indian context.

   Additionally, it aims to propose draft requirements to be included in the revision of IS 3043. This standard can be accessed from https://standardsbis.bsbedge.com/ .

3. **Scope**: Scope of this research project includes –

   a. Conducting a literature survey to gather information on existing Chemical/ Maintenance-free earthing, both in India and internationally.
   b. Defining the application of Chemical/ Maintenance free Earthing.
   c. Collecting data related to the performance, durability, and cost-effectiveness of various maintenance free earthing systems from the end users.
   d. At least 3 sample tests to validate the outcome at various stratas and the data shall compare the earth resistance values among the conventional as well as chemical earth electrode which were existing for a period of more than 5 years in the same premises.

   e. Examining the suitability of chemical and maintenance-free earthing systems for different types of landscapes, soil conditions, and electrical installations across India including sample installation, measurement and monitoring these sample installations.

   f. Identifying the potential advantages, limitations, and challenges associated with implementing these systems in various sectors such as residential, commercial, and industrial and propose draft requirements to be included in the revision of IS 3043.

3. **Expected Deliverables**:

- A comprehensive report outlining the findings of the literature survey, including an overview of existing chemical /maintenance-free earthing technologies.
- Defining the application of Maintenance free Earthing.
- Analysis of collected data regarding the performance, service life-, and cost-effectiveness of these systems in Indian conditions.
- Recommendations for the deployment and implementation of chemical and maintenance-free earthing systems, specifying the suitable contexts and applications.
- Insights into potential safety, environmental aspects , and economic benefits associated with adopting these systems in India.
- Prepare a comprehensive project report incorporating the points mentioned above.

4. **Research Methodology**:

The project will involve the following research methodologies:

- Literature review: Gathering and reviewing relevant published studies, research papers, technical reports, and patents related to chemical and maintenance-free earthing systems in India and other countries.
- Data collection: Collecting data from existing standards, vetted research papers, actual installations, case studies, and field surveys to evaluate the performance and effectiveness of the identified earthing systems.
  (The protocol for declaring the test results should conform to the guidelines prescribe d in the National Accreditation Board for Testing and Calibration Laboratories (NAB L) 141 Guidelines for Estimation and Expression of Uncertainty in Measurement.)
- Field Trials: Conducting experiments and tests to compare the electrical conductivity, corrosion resistance, improvement of the overall performance of resistance with and without these compounds and other relevant parameters of chemical and maintenance-free earthing systems with traditional methods.
- Data analysis: Analyzing collected data using appropriate statistical methods to draw meaningful conclusions and insights.
- Expert interviews and consultations: Engaging with industry experts, professionals, and stakeholders to gain valuable perspectives, advice, and practical insights related to chemical and maintenance-free earthing.

5. **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 data collection	3 months
3	Preparation and submission of first draft report to BIS	4 months
4	Submission of final project report	5 months

7. Support BIS will Provide:

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