TEMPLATE FOR THE TERMS OF REFERENCE FOR THE R&D PROJECTS

(*Refer to the Guidelines on R&D Projects issued vide note SCMD/R&D dated xx-09-23*)

1. Title of the Project: Study of Surge arresters installed in electricity distribution applications and comparison with clause 5.2.5.5.2 of IS 15086: Part 5 : 2020 Surge Arresters Part 5 Selection and Application Recommendations (First Revision).

2. Background:

Distribution Transformer and insulation failures are common across the country. One reason is insulation failure due to transient overvoltage. Surge arresters are employed to limit the transient voltage below the impulse voltage withstand levels of the transformer and other equipment. The effective operation of arrestors will depend upon the way it is explained in clause 5.2.5.5.2 of IS 15086: Part 5: 2020 Surge Arresters Part 5 Selection and Application Recommendations (First Revision). It is noticed that the lead length and loop of the installation are not followed as recommended in IS 15086.

Surge Arresters are installed based on the CEA Safety Regulations as well. The Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2023, regulation 77 explains as below.

> Regulation 77. Protection against lightning. –
>
> (1) The owner of every overhead line, substation or generating station which is exposed to lightning shall adopt means as per relevant standards for diverting electrical surges to the earth due to lightning which may result in injuries.
> (2) The earthing lead for any lightning arrester shall be as short as possible and shall not pass through any iron or steel pipe, but shall be taken as directly as possible from the lightning arrester without touching any metal part to a separate vertical earth electrode or junction of the earth mat already provided for the substation of voltage exceeding 650 V subject to the avoidance of bends wherever practicable:
> Provided that a vertical earth electrode shall be connected to the junction of the earth mat.

The objective of this project is to conduct a study of Surge Arresters installed in the Distribution sector and their suitability to protect the installation from transient overvoltages.

3. Scope: Scope of this research project includes –

a. Conducting a survey to gather information on the practical installation of Surge Arresters in electricity distribution from 11 KV to 33 kV.
b. Analysis on the type of connection and its effective voltage protection level offered to the transformer.
c. Find out the gaps and identify potential improvements in the standards or practices.

4. Expected Deliverables:

- A comprehensive report about the installation of Surge Arresters in the distribution sector from 11 kV to 33 kV at least in 5 states. Both panel-mounted and outdoor structure-mounted installations are to be considered.
- Comparison of the installation implemented in these locations with the recommendations of IS 15086: Part 5.
- Recommendations for the improvements of standards or practices followed in India.
- Report if any improvements are necessary.

5. Research Methodology:

The project will involve the following research methodologies:

- Contacting the distribution companies and visiting their site.
- Find out the methods followed in the Surge Arrester installation. Measure the lead lengths as specified in clause 5.2.5.5.2 of IS 15086: Part 5.
- Find out the recommended practices in other recognised national/international standards.
- Discuss with the Central Electricity Authority and determine the methods they recommended in the safety regulation.
- Comparing the data with the recommendation of IS 15086: Part 5.
- Finding out the gaps and make recommendations for improvement.

6. Requirement of the CVs:

- Proposer shall be industry expert with experience in implementing environmental conscious designs, sustainability programs.

7. Timeline and Method of Progress Review:

The review will be carried out monthly along with consultation of other experts if required. The standards and regulations include literature review after 1 month, the first draft after 4 months and the final draft along with the report at the end of 6 months.

8. Support BIS will Provide:

- BIS will provide access to the latest editions of standards, magazines, Research Journals etc required for the project.
- BIS will provide contacts of DISCOMS and write to DISCOMS to support the R&D project.
- BIS will also provide details of manufacturers, labs, etc.

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