

AT A GLANCE



Laminar Dielectric Cable Systems

Program 36, Project 36.003

Research Value

- Better understanding of failure mechanisms and prevention procedures for longer asset life, fewer customer outages, and lower operations costs.
- Effective inspection and monitoring of assets, leading to increased asset utilization, rapid maintenance intervention prior to spontaneous failure, higher reliability, and lower repair costs.
- New inspection techniques and tools to increase staff productivity and reduce overall maintenance costs.

Member Benefits

- Use the knowledge base, guidelines, methods, and technologies developed in this project to improve productivity, lower cost of operation and maintenance, and extend the life of laminar dielectric cable systems.
- Make more effective use of staff time and budget resources by applying new inspection methods and monitoring technologies.
- Apply selective upgrades and retrofits through a better understanding of relative conditions of their asset fleet, as well as where and under what circumstances cable systems are most susceptible to damage.
- Apply knowledge of corrosion mechanisms and detection to fine-tune monitoring of systems to enhance public and environmental safety.

Laminar dielectric cable systems consist of high-pressure fluid-filled (HPFF), high-pressure gas-filled (HPGF), and self-contained fluid-filled (SCFF) system types. These cables in general have provided long-lasting service, surpassing their design life specifications. The advanced age of many of these assets might be a cause for concern. Replacement costs for laminar dielectric cable systems are high, and the consequences of electrical failures or fluid leaks are significant. Research is needed to:

- Improve understanding of laminar dielectric cable system failure mechanisms.
- Develop and demonstrate inspection, diagnostic, monitoring, and remediation techniques.
- Provide guidance and develop strategies for effective operation, maintenance, life extension, and replacement.

This project investigates and develops condition assessment methods and procedures for laminar dielectric cable systems. Efforts focus on life extension, improved reliability, reduced operation and maintenance costs, and improved support for asset management decision-making protocols. EPRI intends to direct its research at one or more of the following areas:

- Evaluate and demonstrate advanced diagnostic techniques to assess conditions of laminar dielectric cables.
- Develop best practices in dissolved gas analysis and insulating paper and fluid testing for effective deployment of the technologies.
- Develop vintage information for laminar dielectric cable systems for improving asset management strategies.
- Conduct investigations to better understand failure mechanisms of laminar dielectric cables.
- Study buried steel pipe coating degradation as a function of coating types, coating ages, pipe installation environments, and stray current conditions.
- Evaluate and develop methods to effectively detect and mitigate corrosion and corrosive environments.
- Develop technical bases for best practices to improve the effectiveness of cathodic protection systems.

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Research Highlights



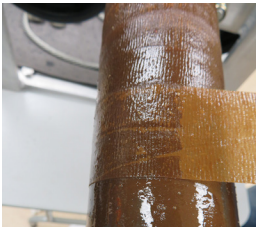
Inspection, Assessment, and Mitigation of Buried Steel Pipe Corrosion

- The task applies various detection techniques to investigate their effectiveness, while studying coating degradation as a function of coating types, pipe installation environments, and stray current conditions.



New Technique Development for Online and Off-Line Condition Assessment of Laminar Dielectric Cable Systems

- This task will evaluate and characterize new techniques for condition assessment and diagnostics of laminar dielectric cables, with emphasis on techniques that provide localization information on potential defects or degradation and continuous online monitoring.
- Techniques under investigation include prototype testing of test stations for buried steel pipe corrosion monitoring.



EPRI Guide for Testing Insulating Paper and Fluid of Laminar Dielectric Transmission Cables

- This task is a multi-year effort to enhance the EPRI comprehensive guide to test and analyze insulating paper and fluid of laminar dielectric cable systems to assess insulation and system conditions.
- This report includes results from tests and case studies.



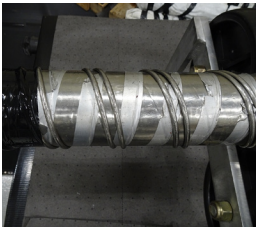
EPRI Dissolved Gas Analysis Guide for High-Voltage Cables and Transformers—Case Studies

- This task continues prior EPRI research to enhance the EPRI comprehensive dissolved gas analysis guide to assess conditions of laminar dielectric cable systems.
- This report also includes example test results and case studies.



Evaluation and Documentation of Vintage Pipe-Type Cable Performance and Experience

- This task enhances the comprehensive vintage guide to document changes in component materials, design, manufacturing, and other known issues of pipe-type cable systems.



Failure Root Cause Study of Laminar Dielectric Cables

- EPRI has performed comprehensive research in developing an approach for life management of cable systems, including cables, terminations, joints, pressurizing plants, and others.
- This task will continue such investigations and perform further laboratory experiments to better understand laminar dielectric cable aging and failure mechanisms.

For more information, contact:

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