

AT A GLANCE

Design, Construction, Ratings, Operation, and Maintenance of Underground Transmission Systems

Program 36, Project 36.001

Research Value

- Make more informed decisions in planning new transmission lines.
- Improve efficiency in underground cable system design and operation.
- Improve productivity and quality in underground cable system construction.
- Assess conditions of existing underground transmission lines and develop fact-based maintenance and replacement strategies.
- Reduce overall installation, construction, operation, and maintenance costs.

Member Benefits

- Improve system long-term performance and design and implement reliable and effective cable systems.
- Validate system designs and enhance cable project planning and management, and to increase and optimize ratings of transmission circuits.
- Reduce costs in all phases of a cable project, from design and construction to operation and maintenance.
- Improve health and safety of personnel working with underground cable systems.
- Lead to more effective asset management.

Cost-effective and reliable underground transmission cable systems depend on sound engineering practices of design, construction, operation, and maintenance. This project develops technologies, software tools, and guides, and provides technical bases for safe, reliable, and efficient underground transmission systems of both extruded and laminar dielectric cables. The project addresses the following needs to equip cable users with knowledge, methods, and tools to execute required tasks throughout the life cycle of underground cable systems:

- Advanced designs and innovative techniques to reduce construction and installation costs.
- Methods and tools to determine and improve cable circuit ratings.
- Cable accessory installation, diagnostics, and long-term performance.
- Safe and effective cable circuit inspection techniques.
- Cable and accessory failure root causes.

Underground transmission engineers, designers, and managers can use the tools, methods, and technologies developed in this project to effectively plan, design, operate, and maintain their underground transmission systems.

EPR1 Technical Contact

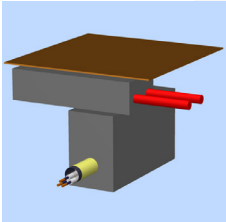
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Research Highlights



Reliable Performance of Transmission Cable Accessories – Long-Term Aging Test Result

- Built on prior EPRI research, this multi-year effort continues to investigate the reliability of transmission cable accessories.
- Included are technical and investigation results from accelerated aging tests at EPRI's Lenox, Massachusetts laboratory, material deterioration test results on field-aged cable accessories, and results of the evaluation of condition assessment tools.



Underground Transmission Workstation – Functional and Technical Enhancements and Developments

- The Underground Transmission Workstation (UTW) is an easy-to-use tool for cable engineers to plan, design, operate, and maintain their extruded and laminar dielectric cable systems.
- The project team is updating and enhancing the functionality of UTW based on EPRI research results.
- UTW includes calculation modules, such as, AC and DC Ampacity, Magnetic Fields, Pulling Tension, Induction, Vault, and NSPAN.



Pipe-Type to Extruded Dielectric Cable Conversion – Technology, Design, and Construction Options

- The report includes assessment of converting existing pipe-type cables using extruded dielectric cables and existing pipe alignments.
- The project task evaluates available solutions, identifies leading industry practices, present any novel ideas for design and installation of extruded cables and accessories in steel pipes, and provides guidelines and recommendations for such conversions.



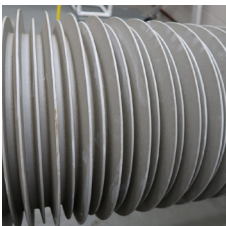
Underground Transmission Cable System Construction and Installation Practices Manual

- Recent advances in underground transmission have led to more demand for best practices and innovative ways to reduce construction and installation costs.
- This task identifies and assesses advanced designs and innovative construction/installation techniques that would contribute to improved operation performance and reduced overall project costs.



Underground Transmission Vault Inspection Using Robotic Techniques

- To improve worker safety and reduce circuit outage requirements, this task continues the investigation of underground transmission vault inspection techniques.
- Concepts and prototype robotic techniques have been demonstrated in laboratory and field manholes.



Industry-wide Performance and Failure Database for Underground Transmission Cables and Accessories

- Central to effective asset management is knowledge of the failure rate of specific components based on age, family, make, model, application, and environment.
- This task is a multi-year effort to gather available information on underground transmission cable and accessory performance issues, and failures of both extruded and laminar dielectric cable systems.

For more information, contact:

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