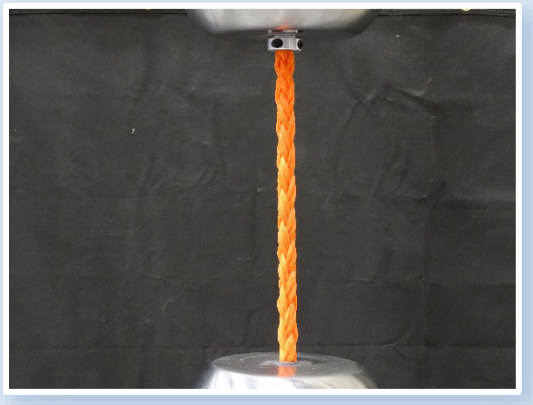
Supplemental Project Notice

TESTING OF JACKETED ARAMID FIBER ROPE FOR LIVE WORKING APPLICATIONS



PROJECT HIGHLIGHTS

- Electrical and mechanical standard tests
- Utility-tailored exploratory electrical testing based on realistic wetting mechanisms and work applications
- Evaluation of mechanical aging to estimate rope lifespan

Background, Objectives, and New Learnings

Maintaining overhead transmission lines is essential for the reliable delivery of electricity, given the high voltage and associated risks. Specialized methods and equipment are necessary to safely work on these lines without disrupting power. Many structures lack permanent climbing features due to safety concerns and the risk of unauthorized access. Consequently, utilities often use expensive alternatives like bucket trucks or helicopters for maintenance.

Rope access technology has gained interest among utilities as a cost-effective alternative method for accessing energized overhead transmission lines. This technology allows workers to be hoisted onto structures and conductors using insulating ropes, reducing the need for aerial devices. Typically, powered ascenders or capstans lift personnel by means of synthetic fiber ropes to reach the work position on the line conductor or structure.

A specific rope access system using jacketed aramid fiber rope has been experimented on energized transmission lines, leading funders to request that EPRI evaluate its electrical and mechanical performance. The primary concern for utilities is ensuring the rope is safe for live line maintenance. To address this, EPRI intends to assess the rope's electrical and mechanical performance using standard and exploratory tests designed to replicate real-life work conditions. This assessment is important to evaluate the rope's suitability for the utilities particular live line applications, ultimately protecting workers during maintenance tasks.

This project seeks to better understand the performance of jacketed aramid fiber ropes exposed to energized environments, and the risks associated with realistic wetting mechanisms and work applications.

Anticipated tests include:

- Standard electrical and mechanical testing.
- Exploratory testing of samples subject to high humidity environments, at the utility's maximum voltage level.
- Evaluation of the mechanical performance of the rope through wear and tear testing.

Benefits

Public benefits include reduced grid downtime, affordable electricity costs due to improved operational efficiency, and increased safety. Funder benefits include enhanced worker safety, validation for broader use of technology and flexibility for live-line applications, cost-effectiveness of maintenance, lifespan estimation of maintenance tools.

Project Approach and Summary

The following high-level tasks define the project approach:

1. **Electrical and mechanical standard testing:** Tests intended to evaluate the electrical performance of rope samples in accordance with the current ASTM or IEC standards. The samples will be subjected to ultimate tensile failure test following the electrical tests, to establish the residual breaking strength.
2. **High humidity/Light rain exploratory electrical testing:** Exploratory electrical tests intended to evaluate the performance of rope samples exposed to high relative humidity (80 ~ 95% RH) or light rain. The samples will be subjected to ultimate tensile failure test following the electrical tests, to establish the residual breaking strength.
3. **Evaluation of the mechanical performance of the rope through wear and tear testing:** This task consists in exposing samples to realistic abrasion mechanisms such as conductor friction, pulleys and capstans, followed by ultimate tensile failure tests to establish the residual breaking strength. The purpose of these tests is to estimate the rope lifespan and closely simulate the anticipated mechanical hazards specific to work applications of the utility funders.

Deliverables

Expected project deliverables include:

- Test results
- Test report
- Tech transfer webcast

Price of Project

This project is $30k per project funder with a minimum of two funders required to complete the full scope.

Project Status and Schedule

The project is estimated to take 12-months to complete from the reception of technical information and rope samples in Charlotte, NC.

Who Should Join

Utilities using jacketed aramid synthetic rope for de-energized or energized construction or maintenance work, or rope access.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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