Evaluation of Aesthetic Wraps for Padmount Equipment

Aesthetic wrap applied to padmount switchgear in the field

- Provide performance data to support decision-making on use of aesthetic wraps for undergrounding projects
- Increase industry knowledge on installation and longevity of aesthetic wrap materials applied to padmount equipment
- Provide performance data on the impact of wrap materials on the thermal behavior of transformers
- Leverage laboratory analyses to explore the effects of wrap materials on the corrosion and resilience
- Enhance understanding of the safety risks and flammability of wrap materials

Background, Objectives, and New Learnings

Proactive undergrounding is an effective strategy for improving distribution system resilience and is being increasingly deployed by utilities. The conversion of overhead distribution to underground often requires utilities to replace overhead facilities with padmount equipment.

One challenge to installing padmount equipment is securing the necessary permissions from property owners, as existing overhead line easements may not be directly transferable to new underground designs. And, while many customers are willing to accept the installation of standard appearance padmount equipment (typically green or brown in color), some are resistant for aesthetic reasons.

To increase the acceptance of padmount equipment, some utilities are considering offering aesthetic wraps on the equipment. Most often, aesthetic wraps are applied to vehicles for advertising purposes. However, the expected service life for vehicular application is likely shorter than expected for wraps applied to utility equipment. Little is known about the longevity or impact on padmount equipment performance of such wraps.

The objective of this research is to examine the performance of aesthetic wraps and to identify any impacts on the reliability, safety, or operation of the underlying padmount equipment. This research aims to address the following questions:

- What effects do the wraps have on equipment thermal behavior?
- How do such wraps impact the enclosure coating materials (corrosion, paint degradation, etc.)?
- Does the presence of a wrap create any worker hazards?
- How long are aesthetic wraps likely to last in the field?
- What would be involved in removing and updating the wraps?

Benefits

This project will provide performance data to help with utility decision-making on the use of aesthetic wrap materials on padmount equipment.

Project Approach and Summary

This research will include performance evaluations of multiple aesthetic wrap materials considering the following aspects:

Corrosion and coating interactions under accelerated aging conditions – EPRI will develop an accelerated aging protocol to simulate field conditions and expected impacts on tank coating materials. This protocol will be applied to selected tank coatings with different wrap materials. A series of post-test assessments will be performed to generate measures of expected performance for wrapped tank materials. These metrics could form a basis for comparison of different materials developed in the future.

Assessment of the impact of aesthetic wraps on equipment thermal loading behavior – The goal of this research task is to determine, empirically, the impact aesthetic wraps have on the thermal behavior of typical padmount single and three-phase transformers. Results may impact the specification of transformers used in locations where wraps may be deployed in the future. EPRI will prepare several transformers both bare and fully covered with different aesthetic wraps. These units

will then be subjected to different loading conditions to establish the relative difference in thermal performance between wrapped and unwrapped units.

Field-aging under different environmental conditions – The units used in the thermal performance evaluation will be deployed to various locations subject to different environmental conditions for up to 18 months. These units will aid in the evaluation of the aged samples from the accelerated aging testing. EPRI may develop a means of correlating the accelerated conditions to field performance. This testing may reveal additional aging mechanisms not readily apparent in other tests.

Behavior upon exposure to open flames – The wrap materials will be subjected to open-flame testing to establish their flammability characteristics should these materials be exposed during a wildfire event.

Deliverables

- Final report detailing the test program, results, and key conclusions of the research.
- Summary and update presentations will be delivered throughout the project to facilitate the sharing of research results as soon as they become available.

The non-proprietary results of this work will be incorporated into EPRI's Distribution Systems R&D program and made available to the public for purchase or otherwise.

Price of Project

$90,000 per participant.

This project qualifies for tailored collaboration (TC) or self-directed funds (SDF) funding. Funding can be split over three (3) years. Five (5) funding companies are required to start work.

Project Status and Schedule

The expected duration of this project is 36 months, with a target launch in January 2023.

Who Should Join

Utilities who are actively seeking or considering the deployment of aesthetic wraps to enhance the efficiency of undergrounding projects.

Contact Information

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

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