Technology Innovation Project *Project Brief*

TIP 23e: EPRI P35 Supplemental: High Temperature Conductor and Connector Systems-Phase II

Context

Advanced high-temperature low-sag (HTLS) conductors are being considered by the electric power industry as an alternative to conventional ACSR (aluminum conductor steel-reinforced) conductors. An HTLS conductor can tolerate higher temperatures and produce lower sags than conventional ACSR conductors. These features enable overhead power lines to attain higher power transfer capacities in the same corridor.

Description

The HTLS conductor-connector systems were designed with the intent to increase the capacity of a line through re-conductoring without the need for new structures or additional right-of-way (no rebuild). This project will collect more information on the anticipated benefits, risks, strengths, and weaknesses of these systems, which potentially could result in more/less need for maintenance activities or new maintenance methods.

A continuation of the "Evaluation of High-Temperature Conductor and Connector Systems" project, this Phase II aims to evaluate additional types of HT conductor-connector systems to expand knowledge and enable utilities to apply these new technologies safely, reliably, and cost effectively to meet rising power demands.

Technical Approach:

- Submit conductor-connector samples to high temperature cycling
- Monitor and evaluate thermal stability and resistance of connectors
- Forensics of the materials following testing

Project tasks include:

- Evaluate the long term performance of Aluminum Conductor Steel-Supported (ACSS), ACSS-HS285 (High Strength core), and stranded carbon core conductor.
- Evaluate the effect of conductor cleaning methods on HT performance – standard brushing vs. "ConductaClean".
- Evaluate swage and hydraulic compression connectors

With additional funding, the performance of these conductors and associated splice and dead-end connectors will be evaluated, based on laboratory tests.

This work will result in a service life prediction model for HTLS conductor-connector systems and a test protocol for high temperature connectors (ANSI C119.7)

Transmission line designers can use the model when making conductor selection decisions and to evaluate options for a line. For instance, a longer/shorter service life is a critical component from a life cycle cost perspective. The model can also be used to test results based on the type of conductor cleaning used to develop installation instructions for connectors.

Line designers will be able to reference ANSI C119.7 as a qualification test in BPA material specifications for HTLS connectors.

Why It Matters

Research results on ACSS, ACSS HS285, and stranded carbon core conductors can enhance industry's understanding of these conductors and offer the potential for line designers to assess the risks and apply these conductors properly, leading to improved public reliability and safety.

This project has future term applications addressing: Line capacity limitations, clearance limitations, right-of-way limitations, budget constraints for upgrades and rebuilds, and growing adverse public reaction to additional transmission lines

Goals and Objectives

Three objectives of this project are to develop:

- A tool to evaluate performance of high-temperature connectors,
- A guide to operate an overhead line reliably within given limits,
- A methodology to improve on high-temperature connector designs.

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Project Start Date: January 1, 2014

Project End Date: December 31, 2014

Reports & References (Optional)

Links (Optional)

Funding

BPA FY2015 Membership: $25,000

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Participating Organizations

EPRI
Hydro One
CenterPoint Energy
Duke Energy
Con Edison