

Technology Innovation Project



Project Brief

TIP 23c: EPRI P35 Supplemental: Field Trial of ACCC Carbon-Fiber Core and ACSS HS285 Ultra-High Strength Conductors

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 potentially enable overhead power lines to attain higher power transfer capacities on the same corridor.

As of today, a number of high-temperature low-sag conductors are commercially available. Industry experience with each HTLS conductor varies. Aluminum Conductor Steel-Supported (ACSS), Gap, and Invar conductors have been around much longer than the other HTLS conductors. Gap conductors have been used in Japan for more than ten years, where the need for increased power flows occurred sooner than that need in North America. Invar conductors have been used in Asia for a number of years. Although ACSS conductors have been around for a long time, they have not been used extensively. Composite-core HTLS conductors such as Aluminum Conductor Composite Core (ACCC) were developed in recent years, and consequently, the power industry has the least experience with these conductors.

Description*

The needs for evaluating each of these HTLS conductors differ and are dependent on experience with the technology and materials used for the conductor. To assess the risk of using HTLS conductors, EPRI is conducting research to address the following issues:

- Handling and Stringing
- Operating and Maintaining
- Material Behavior
- Long-Term Performance
- Life Expectancy Prediction; and
- Specifications

Utilities are concerned about the performance of Aluminum Conductor Composite Core (ACCC) conductors during prolonged exposure to temperatures above 150°C, as well as their sag characteristics under ice loads. Developed in 2009, there is little experience with ACSS HS285 conductors under extended high-temperature operations and heavy weather loads.

Hydro One Networks has a site in Ottawa, Canada, that is available to EPRI members for field trials of HTLS conductors. At that site, the circuit normally carries a large amount of power. It also experiences heavy ice loads and cold temperatures at this location. It is therefore an ideal location for field trials of HTLS conductors.

ACCC and ACSS HS 285 conductors will be installed at the Hydro One test site in Ottawa, Canada. The line at this site carries a large amount of current from Ottawa to eastern Ontario customers, and is exposed to extreme ice, wind, and cold temperature. Instrumentation will be installed to monitor conductor performance continuously by recording key line parameters and weather data. The information will be transferred by cellular communication to EPRI for evaluation and assessment of line performance.

Through this project, the performance of these conductors and associated splices and dead-ends will be evaluated, based on field trial evidence and laboratory tests.

Why It Matters

Research results on ACCC and ACSS HS285 conductors can enhance industry's understanding of these conductors and offer the potential for line designers to assess the risks and apply these conductors appropriately, leading to increased power transfer as well as improved public reliability and safety.

Goals and Objectives

The objective of this field trial is to determine the performance of these two conductors under extreme electric and mechanical loading conditions in a real operating system by monitoring their behaviors in order to gain confidence in the applications of these conductors.

Deliverables

There will be four deliverables.

- Performance of ACCC and ACSS HS285 Conductors under Extreme Electric and Mechanical Loads
- Specifications and Recommendations for Design, Testing and Installation of ACCC and ACSS HS285 Conductors
- Installation Procedure for ACCC and ACSS HS285 Conductors
- Field Trial of ACCC and ACSS HS285 Conductors

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Funding

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Reports & References

Links

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Participating Organizations

EPRI
Hydro One
National Grid UK
CenterPoint Energy
Duke Energy
Con Edison
Manitoba Hydro

