

# CURRENT TRANSFORMER TESTING FUNDAMENTALS

## Overview:

This interactive 2-day course focuses on theoretical background with practical field experience to provide engineers and technicians with the vital knowledge for offline electrical testing of current transformers. For each test, there will be an in-depth discussion of each measurement, physics behind the measurement, setup and test methodology, and acceptance criteria. There will be an in-depth discussion of each measurement, its purpose, and expected results. A Vanguard specialist will provide training to decipher and review apparatus test results so that they are clear and easy to understand.

## Learning Outcomes:

Upon completion of this course, the participant will be able to:

- Understand the role and operation of current transformers
- Expedite substation commissioning
- Understand when to perform routine off-line tests
- Interpret test results from numerous case study field examples
- Effectively create test plans using the manufacturer's current transformer specifications
- Confidently use the Vanguard EZCT product line and EZCT-2000 software to perform routine CT tests
- Improve asset management through accurate electrical asset condition assessment

## Course Audience:

Substation test technicians working in operations, maintenance, engineering, or other service field in which knowledge of current transformers testing methods and evaluation is a required part of their job responsibilities.

## Duration:

2 Days

## Class Size:

8-15 Attendees

## Credits:

Up to 1.6 CEUs or 16 Professional Development Hours

## Presenter(s):

An experienced Vanguard Engineer or Technical Application Engineer.

## COURSE OUTLINE

# Current Transformer Off-line Electrical Testing

The course program contains the following training outline:

- Introduction to Current Transformers - Basic current transformer theory will be presented discussing their operation and various types. An overview of the test methodologies will be presented.
- Construction and Types - Various current transformer types will be discussed as well as their characteristics and construction. This includes a discussion of CT voltage and accuracy classes.
- Offline Testing - Offline testing will consist of simulating as close to bench-top test as possible in a substation environment for optimal performance and results.
- Winding Resistance - Important test for detecting connection problems, but it can be subject to much variation unless care is taken in the measurement. The test method will be reviewed along with how to avoid common pitfalls in test technique. Best practice for result interpretation will be discussed.
- Excitation - Excitation test will be explained using the IEEE 57.13.1 Voltage Method. The importance of understanding the knee point will be explained.
- Turns Ratio - IEEE 57.13 Voltage Method for performing turns ratio tests will be explained as well as understanding the effects of excitation on the turns ratio.
- Polarity and Phase - Importance of CT polarity and phase in a system will be discussed in detail.
- Burden - Burden test procedure and results will be explained.
- Insulation Resistance - Importance of performing insulation resistance tests before commissioning and as part of routine maintenance will be covered.
- Hands on CT Testing using Vanguard EZCT Product Line - Specific training will be provided for performing CT tests with the Vanguard EZCT Product Line.
- EZCT-2000 Software - Users will be introduced to the Vanguard EZCT-2000 application software and how to perform various CT tests using the software. Topics will include creating test plans, translating data, and working with test records and test plans.
- Case Studies - Field test results related to the material presented will be provided for seminar participants to discuss and analyze.