

Substation Maintenance II

4.5 Days, 3.6 CEUs

This course is the next step after Substation I, which will help enhance the skills needed to perform all substation tasks. It offers training on the components of power and distribution type transformers, including common insulating and cooling mediums, and explains common transformer configurations.

This course is designed to provide an in-depth study to aid skilled qualified substation maintenance technicians in the safe performance of substation component preventive maintenance.

This hands-on course is intended for apprentices, technicians and engineers responsible for the maintenance and testing of industrial and utility substations.

Pre-Requisites:

The participant must complete the Substation Maintenance I course before attending this course.

Lab and Classroom Attire:

AVO is committed to the personal safety of each participant and requires long pants and ANSI rated "safety toe" work shoes for lab activities. Lecture courses may involve a tour of a work or shop area and for this reason open toe shoes and shorts are not considered appropriate attire for classroom.

Learning Objectives:

Upon completion of this course and lab practice, the participant will demonstrate, by attaining a minimum average grade of 80% (between lab and final exam), that he/she is able to:

- Indicate the configuration and function of common equipment found in a substation.
- Identify components of power and distribution type transformers, including common insulating and cooling mediums.
- Describe and carry out AC tests performed on transformers.
- Perform a nameplate data exercise and calculate turns ratio of transformer windings.
- Summarize ASTM requirements for testing and sampling gas and oil in transformers.
- Outline storage battery maintenance.

SCOPE

Day 1*

I. Introduction

II. Introduction to Safety

- A. Lab Safety Rules
- B. On-the-Job Safety

III. Nameplate Data

- A. Transformer Nameplate
- B. Nameplate Data Exercise

IV. Transformer DC Testing

- A. General Safety Precautions
- B. DC Testing
- C. Insulation Resistance
- D. Winding Resistance Testing

Day 2

V. Transformer AC Testing

- A. AC Testing
- B. Transformer Winding Testing
- C. Transformer Bushing Testing
- D. Core Excitation Current Testing

VI. Transformer Oil Testing

- A. Insulating Liquids

B. Liquid Sampling

C. Sampling for Gas-In-Oil Analysis

D. Silicone Insulating Fluid

E. Dielectric Breakdown Voltage Test

F. Color Testing

G. Visual Examination

H. Neutralization Number Test

I. Interfacial Tension Test

J. Moisture Content Test

K. Liquid Insulating Power Factor Testing

VII. Transformer Gas Testing

A. Gas Detection

B. Oxygen Testing

C. Combustible Gas Testing

D. Gas Analysis Interpretation

Day 3

VIII. Storage Battery Maintenance

- A. Systems and Components

B. Applications

C. Battery Types

D. Battery In-Service Operation

E. Effects of Temperature and Duty Cycle on Battery Life

F. Battery Safety

G. Battery Inspections

IX. Labs

A. Transformer Insulation Resistance Testing

B. Transformer Turns Ratio Testing

Day 4

X. Labs

A. Transformer Winding Resistance Testing

B. Transformer Power Factor Testing

Day 5 (Half Day)

XI. Conclusion

- A. Review
- B. Final test

*Class scheduling times may vary based on discussion and size of class.