Circuit Breaker Maintenance, Med-Voltage

3.5 Days, 2.5 CEUs

Unlike a low-voltage breakers, medium voltage breakers rated at 1 kV or higher rely on external controls to operate effectively. That means technicians have more components to test and maintain to ensure a 3 to 5 cycle operating time. Failure of one of these breakers can cause catastrophic damage to other equipment and is extremely hazardous to nearby personnel. With safe and proper maintenance, technicians can ensure that tripping operations execute as required for equipment protection. In addition to improving electrical system reliability, well maintained circuit breakers also minimize the arc flash hazard energy levels that technicians can be exposed to during a fault.

This hands-on course is intended for new or experienced electricians and technicians that install, maintain, repair or troubleshoot air and vacuum metal-clad circuit breakers and switchgear, rated at 1 kV and higher. The student should have basic knowledge of AC/DC electricity.

Lab and Classroom Attire

AVO is committed to the personal safety of each participant and requires safety glasses, 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 the classroom.

Learning Objectives

To receive 2.5 CEUs, the participant must attend 3.5 days of class (25 contact hours) and attain a minimum average grade of 80% (overall grade will consist of 50% lab practice and 50% final exam). Upon completion of this course, the participant will demonstrate that he/she is able to:

- Identify components and insulation mediums for all circuit breakers (vacuum, air magnetic, oil and SF_6).
- Utilize appropriate personal protective equipment and safe work procedures including lockout/tagout.
- Evaluate breaker ratings for various applications.
- Interpret control schematics.
- Outline removal and restoration procedures.
- Adjust linkages, switches and contacts.
- Practice circuit breaker maintenance service per manufacturers' and NETA MTS specifications.
- Perform and evaluate the results of all required tests during labs.

SCOPE

Day 1* (7 contact hours)

I. Introduction (0.5 hr)
- A. Schedule
- B. Course Outline

II. Safety for Technicians (0.5 hr)
- A. Lab Safety Rules
- B. On-the-Job Safety

III. Circuit Breaker Fundamentals (1 hr)
- A. Circuit Breaker Standards
- B. Circuit Breaker Ratings
- C. The Interrupting Rating
- D. MVA versus KA
- E. Principles of Arc Interruption
- F. Contacts
- G. Insulation Requirements
- H. Circuit Breaker Controls
- I. Methods of Operation
- J. Auxiliary Switches

AM Break

IV. Maintenance and Testing Air-Magnetic Circuit Breakers (4 hours)
- A. Maintenance and Testing Standards

Lunch
- B. Specialty Tools
- C. General Maintenance
- D. Electrical Testing

PM Break
- E. Labs

Day 2 (7 contact hours)

V. Maintenance and Testing Vacuum Circuit Breakers (7 hours)
- A. Maintenance and Testing Standards
- B. Principles of Operation

AM Break
- C. General Maintenance
- D. Electrical Testing

Lunch
- E. Lab

PM Break
- E. Lab

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

AVO Training Institute is accredited by the International Association for Continuing Education and Training (IACET) and is accredited to issue the IACET CEU

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SCOPE

Day 3 (7 contact hours)

VI. Oil Circuit Breaker Maintenance and Testing (7 hours)
- A. Maintenance/Testing Standards
- B. Inspections/Test Procedures

AM Break
- C. Oil Circuit Breaker Types
- D. Oil Circuit Breaker Construction
- E. Bushings
- F. Current Transformers

Lunch
- G. Oil Circuit Breaker Maintenance
- H. Power Factor Testing of Oil Circuit Breakers

PM Break
- I. Lab

Day 4 (Half Day) (4 contact hours)

VII. Circuit Breaker Cell Maintenance and Control Circuitry (3 hours)
- A. Switchgear Cell Configurations
- B. Switchgear Maintenance
- C. Maintenance Intervals
- D. Switchgear Cell Maintenance
- E. Circuit Breaker Control Circuitry

AM Break

VIII. Conclusion (1 hour)
- A. Review
- B. Final Exam