

Hands-On

# Substation Maintenance, Testing and Repair



## Course Description

This Hands-On course will cover the maintenance, testing and repair requirements for common substation devices, including power transformers, oil, air and vacuum circuit breakers, switch gear, ground grid systems, batteries, chargers and insulating liquids. This course focuses on what to do, when to do it and how to interpret the results from testing, maintenance and repair. Substation maintenance is a key part of any plant's maintenance program. Failures in key components such as racking mechanisms, meters, relays and busses are the most common cause of unplanned outages. Transmission, distribution and switching substations generally have switching, protection and control equipment and one or more transformers. Having skilled substation maintenance technicians is essential to equipment reliability.



This course focuses on maintenance and testing of switch gear, circuit breakers, batteries and protective relays, and more...

## Students Will Learn

- Substation Types, Applications, Components and Safety Procedures
- Medium-Voltage Circuit Breaker Maintenance, Testing and Repair Methods
- Perform Insulation Resistance, Contact Resistance on Air, Oil and Vacuum Breakers, and Tank Loss Index
- On Oil Circuit Breaker and Vacuum Bottle Integrity Tests on Vacuum Breaker
- Switch gear Arrangement, Torque Requirements, Insulation Systems and Maintenance Intervals
- Perform Switch Gear Inspection and Maintenance
- Battery Types, Applications, Systems and Components
- Perform Battery Maintenance, Testing and Repair
- Substation Types, Applications, Components and Safety Procedures
- Air and Disconnect Switch Fundamentals, Maintenance and Testing Methods
- Perform Air Disconnect Maintenance, Testing and Repair
- Ground Testing Fundamentals, Maintenance, Testing and Repair Methods
- Perform Ground Resistance Testing
- Transformer Fundamentals, Maintenance, Testing and Repair Methods
- And More...

## Target Audience

Designed for apprentices, technicians and engineers that are responsible for the maintenance and testing of industrial and utility substations.

## Prerequisites

Requires working knowledge of AC/DC theory. Students must wear safety toe shoes. Field experience beneficial but not required.

## Course Outline

This Course Has Been Customized To Topics That Have Been Provided By Client

### Day One (8 Hours)

- Configuration & function of equipment commonly found in a substation; typically components of air, oil, and vacuum circuit breakers and metal clad switchgear
  - Voltage class, ratings, interrupting ratings, PPE use, racking
- LV & MV circuit breakers
  - Operation, control and functionality
- Components & insulation mediums
- Safety and PPE (all participant have attended the electrical safety class)
- Breaker ratings for various applications
- Interpreting control schematics NEMA function numbers explained along with NETA testing, maintenance and repair details that are associates with this type of equipment

### Day Two (8 Hours)

- Identification of and operation of electromechanical/digital relay components
- Explain targets and relay indicators and how the relays react to a fault or condition
- Interpret AC & DC indicator relays and safety functions

### Day Three (8 Hours)

- Understanding Testing and Maintenance

## Delivery Method

On-Site with numerous Hands-On labs and exercises.

## Equipment Requirements

**(This apply's to our hands-on courses only)**

BTS also encourages all attendees to bring their own equipment to the course. This will provide attendees the opportunity to incorporate their own gear into the labs and gain valuable training using their specific equipment.

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## Course Length

3 Days