

# ELECTRICAL SAFETY PRACTICAL SKILLS FOR SWITCHGEAR

This course provides the practical skills and knowledge for working on or about electrical low and medium-voltage switchgear. NFPA 70E, Standard for Electrical Safety in the Workplace, requires qualified workers to demonstrate their “skills and knowledge related to the construction and operation of electrical equipment and installations...” In addition, the standard requires employees learn to identify hazards and reduce risk.

This course addresses low and medium voltage switchgear construction and operations and, helps participants identify hazards about this equipment and teaches steps they can take to minimize risk. The NTT Low Voltage Switchgear trainer allows participants to follow written procedures to electrically operate a low voltage power circuit breaker, rack-in and rack-out breakers and, perform infrared and visual inspections of circuit breakers. Participants will also install and remove temporary protective grounds using ground clusters and a shotgun.



## CLASS FORMAT:

Combination of lecture and hands-on training

## STANDARD CLASS SIZE:

NTT recommends a class of no more than 12 participants to obtain the best results.

## NTT TO PROVIDE:

- One day (8 contact hours) of on-site instruction
- NTT Text: Electrical Safety Practical Skills for Switchgear
- Classroom consumables
- Completion certificates
- Course syllabus, outline, table of contents, or training objectives
- Shipping and instructor travel logistics

## EQUIPMENT:

- NTT Switchgear Trainer: Westinghouse/Eaton DS electrically operated low voltage power circuit breaker and switchgear cubicle
- NTT Temporary Grounding Trainer (ground cluster, shotgun live line tool, buswork for grounding)
- High Voltage Digital Phasing Meter
- High Voltage Detector
- Noncontact Diagnostic Tools: Infrared camera and infrared window, ultrasonic detector
- Electrical PPE (PPE Case #1 only)

## CLIENT PROVIDES:

- Classroom of 500 square feet or greater
- Projection screen, white board and/or flip chart(s)

## WHO SHOULD ATTEND:

- Electrical workers who work on or about switchgear
- plant operators who operate electrical switchgear
- Supervisors
- Managers
- HSE personnel responsible for implementing electrical safety programs that include any routine operation or maintenance of switchgear



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## COURSE AGENDA

### SWITCHGEAR AND POWER CIRCUIT BREAKER BASICS

- Types and ratings of switchgear and circuit breakers
- Identifying switchgear hazards
- Understanding breaker clearing times
- Recommended power circuit breaker and switchgear maintenance
- Switchgear battery maintenance and safety
- NEC® requirements for switchgear

### SWITCHING OPERATIONS

- Review of one-line drawings and typical switching procedures
- Automatic Transfer Switch (ATS) operation
- Manual switching operations
- Maintenance Switch operation
- Switching transient issues: transformer isolation, paralleling

### HANDS-ON EXERCISES. PARTICIPANTS PERFORM THE FOLLOWING EXERCISES:

- Develop a Job Safety Plan for switchgear work
- Inspect equipment
- Determine if Normal Operation applies
- Read and interpret labels
- Determine PPE for Shock Hazard protection
- Determine method to select PPE for Arc Flash Protection
- Identify steps in the work process and assess hazards for each step
- Select and prepare PPE
- Determine and setup boundaries
- Perform Infrared Thermography inspection
- Use ultrasonic detector or partial discharge tester as applicable to monitor for signs of arcing
- Demonstrate safe work practices for breaker opening/closing

- Demonstrate safe work practices for racking breakers
- Perform a visual inspection of breaker and cubicle
- Use a digital high voltage phasing meter to test for voltage on the NTT grounding trainer
- Install and remove temporary personal protective grounds on the NTT grounding trainer



**CAPTION:** The Eaton DS Low Voltage Power Circuit Breaker (formerly Westinghouse) is a modern air circuit breaker commonly used in distribution systems throughout industry. The 800 Amp frame size breaker supplied for class is operated both electrically and mechanically and is fully rackable in a mock cubicle with an infrared window, bus work and control power.