

LV, MV, HV Switchgear Operation & Maintenance

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Energy Milestones Corporation Advancing Professionals to the next level

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LV, MV, HV Switchgear

Operation & Maintenance

Overview

The course focuses mainly on the construction, operation, maintenance and testing of switchgears, with reference to auxiliary protective relays and equipment necessary for its operation. Industrial electrical installations usually comprise low voltage, medium voltage and high voltage equipment and switchgears. These differences in voltage ratings have many safety aspects and understanding of its operations and maintenance to be considered very carefully. To ensure safety of operators and maintenance personnel, proper switching procedures are necessary and more so when the circuits have multiple feeds and are complex. Switchgear operation and maintenance play an important role in the safe distribution of electrical power.

Course Objectives

At the end of this course the participants will be able to:

- Understand the role and importance of LV, MV and HV switchgears
- Determine the components and operations gas and vacuum circuit breakers
- Understand the operation and selection of relays and switchgear interlocking
- Explain the different types of maintenance and testing for switchgears
- Analyze results from condition based maintenance

Course Content

1. Types of protection systems in an electrical installation
 - Types of low-voltage protection and control equipment
 - Circuit breakers' operation and construction
 - Fuses and classifications for protective devices
 - Discrimination and protective devices rating selection
 - Types of current situation and fault clearing process
 - Preference for fuses over circuit breakers



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Course Content

2. Air, Sulphur Hexafluoride (SF₆) and vacuum circuit breakers

- Types of medium voltage circuit breakers
- Air circuit breaker construction and operation
- Sulphur Hexafluoride (SF₆) circuit breaker construction and operation
- Vacuum circuit breaker construction and operation
- MV circuit breaker solid state tripping systems
- SF₆ hazards and test instruments

3. HV circuit breakers, current and potential transformers

- Types of high-voltage switchgears
- Live tank and dead tank circuit breakers
- Operation and switching mechanisms of HV circuit breakers
- HV current transformer construction, operation, and maintenance
- HV potential transformer features and operations
- Auto reclosers, load switches, disconnectors and sectionalizers

4. Types of relays for protection and safety

- Types of protective relays and functions
- Protection characteristics and applications
- Switchgear interlocking
- Solid state protection relays for MV & HV installation
- Safety in MV and HV substations
- Types of MV and HV switchboards

5. Maintenance and testing of switchgears

- Importance of maintenance and testing
- Types of maintenance, including conditioned base maintenance
- Installation, commissioning, and post-commissioning maintenance
- Documentation requirements
- Manufacturer testing, factory and site acceptance tests
- Failure reporting and analysis of partial discharge and infrared tests



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Targeted Audience

- Electricians
- Electrical Supervisors
- Plant Electricians
- Operations & Maintenance
- Engineers & Supervisors
- Maintenance Professionals

Course Methodology

Facilitated by an experienced professional trainer, this training course will be conducted as a highly interactive workshop session. A variety of training methodologies and facilitation techniques will be used before and during the course whenever applicable. These methods are aimed at enhancing individual and group interaction while maximizing learning. Some of these methods are:

- Online Pre-post Test
- Colorful Visual Aids
- Gamification
- Self-Assessment Instruments
- Simulations
- Case Studies
- Videos
- Group Exercises & Discussions
- Role plays
- Indoor & Outdoor games

