

# GULF INSTITUTE



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# LV, MV and HV Circuit Breakers

## INTRODUCTION

- This highly participative training course is designed to provide you with the skills to understand how circuit breakers are selected for specific applications, and how they are designed, installed and safely operated in industrial process plants, particularly in the oil and gas, mining and minerals processing and heavy industries.
- The LV, MV and HV Circuit Breakers training course is interactive and encourages delegates to participate through questions and answers, along with opportunities to discuss with the presenter specific issues which may result in appropriate solutions.

### Participants will develop following competencies by understanding:

- Practical circuit breaker design and Operation to ensure safe and reliable application
- The differences between circuit breakers and other circuit control and isolation devices
- The different types of circuit breaker used for LV, MV and HV applications
- Circuit breaker operation incorporating current transformer, potential transformer and relays
- Circuit Breaker versus current limiting fuse
- Time current characteristics of a circuit breaker operation
- Typical switchroom, substation and switchyard circuit breaker layouts
- The installation, commissioning and testing of circuit breakers
- The arc quenching methods of circuit breakers
- The state-of-the-art hybrid circuit breakers

## PROGRAMME OBJECTIVES

### LV, MV and HV Circuit Breakers training course aims to enable participants to achieve the following objectives:

- Understand the application and importance of circuit breakers
- Learn how different types and voltages of circuit breakers operation
- Understand the fundamental safety requirements for personnel and equipment
- Learn about different types of electrical distribution systems and how they are configured
- Learn how circuit breakers and their associated switchboards are installed
- Understand the basic requirements for safe and reliable operation
- Discover the type of circuit breaker installed in the gas insulated switchgear
- The importance of the maintenance of circuit breakers and associated equipment

## WHO SHOULD ATTEND?

- If you work in the Utilities, Oil and Gas, Minerals Processing, Mining and Heavy Industries, this LV, MV and HV Circuit Breakers training course will provide you with a detailed understanding of the critical role that the correct selection and installation play in the operation and maintenance of LV, MV and HV Circuit Breakers.

### It is specifically tailored to suit:

- Senior / Lead / Principal Electrical Engineers
- Electrical Design Engineers
- Project Managers and Engineers working on Electrical Power Distribution and Generation Projects
- Electrical Construction and Commissioning Engineers and Technicians
- Electrical, Operations and Plant Maintenance Managers and Support Engineers
- Electrical Maintenance Supervisors and Lead Technicians
- Experienced Maintenance and Electrical Technicians

## TRAINING METHODOLOGY

- This training course will combine presentations with interactive practical exercises, supported by video materials, activities and case studies. Delegates will be encouraged to participate actively in relating their particular protection requirements at their workplace.
- There will be adequate time given for group discussion during and at the end of each session, including detailed case studies and anecdotes on based on the subject matter and the facilitator's own experience in the field.

## PROGRAMME SUMMARY

- LV, MV and HV Circuit Breakers training course covers many details that relate to Circuit Breakers and Switchboard / Switchyard Design and Installation, from basic principles to the complex application of this equipment in large plants and facilities, including their Operation, Maintenance and Fault Finding.
- It is designed to be beneficial for professionals with an electrical background who require a detailed understanding of Circuit Breakers and Switchgear for their work or project execution.

## PROGRAM OUTLINE

### Fundamentals of Circuit Breakers

- A brief history of circuit breakers and their development
- Fundamentals of circuit breaker operation
- Types of LV, MV and HV circuit breakers
- Circuit breakers and substation designs
- Circuit breaker verses current limiting fuses

## The Construction, Application, Control and Protection of Circuit Breakers

- Circuit breaker arc quenching characteristics
- Circuit breakers for overcurrent protection
- Types of electrical faults and circuit breaker operation
- Current limiting fuses
- Instrument transformers and protection relays
- Time current curves for circuit breakers

## Types of Circuit Breakers for LV, MV and HV Systems

- Operation and construction of miniature circuit breaker
- Operation and construction of molded case circuit breaker
- Operation and construction of air circuit breaker
- Operation and construction of SF6 circuit breaker
- Operation and construction of vacuum circuit breaker
- Operation and construction of state-of-the-art hybrid circuit breaker

## Circuit Breaker Maintenance in Switchboards and Switchyards

- Maintenance strategies
- Condition based maintenance for outdoor circuit breaker
- Live tank circuit breaker
- Dead tank circuit breaker
- SF6 circuit breaker maintenance and tests
- Gas insulated switchgear and substation

## The Installation, Commissioning, Maintenance and Fault-Finding Requirements for Safe and Reliable Operation

- Green grid gas and greenhouse gas
- Circuit breaker routine tests
- Testing and commissioning of circuit breakers
- The LSIG modes of circuit breaker safe operations
- Common circuit breaker faults

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